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[129*]

Royal Observatory, Greenwich,
London, S.E.
1879. April 5.

Sir,

I have the honor to inform you that the publications of the Royal Observatory, mentioned on the next leaf, presented to you by authority of the Lords Commissioners of the Admiralty, have been forwarded

I request the favor of an acknowledgment of receipt.

I have the honor to be,
Sir,
Your very obedient Servant,
A. M. W. Downing

To
J. T. Campbell

[25006.] 1000.—12 76. Wt. 11028.

J. F. Campbell

Niddry Lodge
Kensington
London W.

April 5. 1879.

See page CXV

RESULTS

OF THE

MAGNETICAL AND METEOROLOGICAL OBSERVATIONS

MADE AT

THE ROYAL OBSERVATORY, GREENWICH

IN THE YEAR

1876:

UNDER THE DIRECTION OF

SIR GEORGE BIDDELL AIRY, K.C.B. M.A. LL.D. D.C.L.,

ASTRONOMER ROYAL.

PUBLISHED BY ORDER OF THE BOARD OF ADMIRALTY

IN OBEDIENCE TO HER MAJESTY'S COMMAND.

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1878.

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ERRATUM.

INTRODUCTION TO GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, every Year from 1862 to 1876.

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For Introduction to Greenwich Magnetical Observations, *read* Introduction to Greenwich Meteorological Observations.

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ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

MAGNETICAL AND METEOROLOGICAL OBSERVATIONS.

1876.

GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, 1876.

INTRODUCTION.

§ I. *Buildings of the Magnetic Observatory.*

In consequence of a representation by the Astronomer Royal, dated 1836, January 12, and a memorial by the Board of Visitors of the Royal Observatory, dated 1836, February 26, addressed to the Lords Commissioners of the Admiralty, an additional space of ground on the south-east side of the former boundary of the Observatory grounds was inclosed from Greenwich Park for the site of a Magnetic Observatory, in the summer of 1837; and the Magnetic Observatory was erected in the spring of 1838. Its nearest angle in its present form is about 174 feet from the nearest point of the S.E. dome, and about 30 feet from the office of Clerk of Works. It is based on concrete and built of wood, united for the most part by pegs of bamboo; no iron was intentionally admitted in its construction, or in subsequent alterations. Its form, as originally built, was that of a cross with four equal arms, very nearly in the direction of the cardinal magnetic points as they were in 1838; the length within the walls, from the extremity of one arm of the cross to the extremity of the opposite arm, was 40 feet, the breadth of each arm 12 feet. In the spring of 1862, the northern arm was extended 8 feet. The height of the walls inside is 10 feet, and the ceiling of the room is about 2 feet higher. The northern arm of the cross is separated from the central square by a partition, so as to form an ante-room, which is occupied by computers of the Magnetical and Meteorological Department. The meridional magnet for observations of absolute declination, formerly used also for observations of variations of declination, (placed in its position in 1838), is mounted in the southern arm; and the theodolite by which the magnet-collimator is viewed, and by which circumpolar stars for determination of the astronomical meridian are also observed, (for which observation an opening is made in the roof, with proper shutters,) is in the southern arm, near the southern boundary of the central square. The bifilar magnet, for variations of horizontal magnetic force (erected at the end of 1840), was mounted near the northern wall of the eastern-arm; and the balance-magnetometer, for variations of vertical magnetic force (erected in

41663. Wts. 17551 & 8038.

1841) was mounted near the northern wall of the western arm. Important changes have subsequently been made in the positions of these instruments, as will be mentioned below. The sidereal-time-clock is in the south arm, near the south-east re-entering angle. The fire-grate (constructed of copper, as far as possible,) is near the north end of the west side of the ante-room. Some of these fixtures may contain trifling quantities of iron; and, as the ante-room is used as a computing room, it is impossible to avoid the introduction of iron in small quantities; great care, however, is taken to avoid it as far as possible.

In 1864, a room, called the Magnetic Basement, was excavated below the whole of the Magnetic Observatory except the ante-room; the descent to it is by a staircase close to the south wall of the western arm of the building.

For the theodolite, a brick pier was built from the ground below the floor of the Basement, rising through the ceiling into the south arm of the upper room, and supporting the theodolite in exactly the same position as before.

Instead of a single meridional magnet performing the double functions of "magnet for determining absolute magnetic declination," and "magnet carrying a mirror for photographic register," there are now two meridional magnets, one in the Upper Room and one in the Basement. The upper magnet is in a position about 10 inches north of the former position of the declination-magnet; it carries a collimator, for observation by the theodolite; but, in reversion of position of the collimator, the collimator is always either above or below the magnet, so that the magnet is always in the same vertical. The lower magnet, which is in nearly the same vertical with the upper magnet, carries the mirror for the photographic register of the continual changes of declination. A massive brick pier is built in the south arm of the Basement, covered by a stone slab; upon it is fixed the gun-metal stand carrying the photographic lamp, and the narrow chink through which it shines; from the stone slab rise three smaller piers, upon which crossed slates are placed; and from these rises a small pier through the ceiling, to the height of 18 inches above the upper floor, carrying the suspension of the lower magnet; the skein of silk, which supports the lower magnet, passes through a hole in one of the slates. Upon the slates on the brick piers rest the feet of the original wooden stand carrying the suspension of the upper magnet. As, from time to time, the wooden stand has been shifted slightly to the west, with change of the magnetic meridian, its western support had, in course of time, reached such a position that it became necessary in 1876 to place, on the top of the original slate, another, bound by brass cramps to the brick pier, but projecting further west. On this the support of the wooden stand now rests.

The bifilar-magnetometer is in the Basement, in a position vertically below its former position. A massive brick pier, surmounted by a thick slab of stone (upon which the metal stand carrying the photograph lamp and narrow chink is fixed) supports a pier consisting of a back and return-sides, which rises through the ceiling

about 2 feet above the upper floor, and is crowned by a slate slab that carries the suspension of the bifilar-magnetometer.

The vertical-force magnetometer is in the Basement, in a position vertically below its former position; it rests upon a brick pier, capped by a thick stone; to which also is fixed the plate of metal with narrow chink through which passes the light of the photographic lamp.

To the lower part of the theodolite-pier, within the Basement, are fixed telescopes for eye-observation of the bifilar and vertical-force magnetometers. They are protected from accidental violence by guards fixed to the floor, first attached on 1871, May 2.

At the south-east re-entering angle of the Basement (which has been rebated for the purpose) is the horizontal photographic cylinder, which receives the traces of the movements of the declination-magnet and the bifilar-magnet. The angle is so far cut away that the straight line joining their suspensions passes at the distance of one foot from the wall, and thus the cylinder receives the light from the concave mirrors carried by both instruments, at right angles to its surface. The vertical cylinder which receives the traces of the movements of the vertical-force-magnet, and of the self-registering barometer near it, is east of the vertical force pier.

In the south-east corner of the eastern arm is placed the apparatus for self-registration of the spontaneous galvanic currents on the wires leading respectively from Angerstein Wharf to Lady Well Station (on the Mid Kent Railway), and from North Kent Junction (on the Greenwich Railway) to Morden College end of the Blackheath Tunnel (on the North Kent Railway). The straight lines connecting these points intersect each other nearly at right angles, at a point not far distant from the Observatory (see § 12 below).

The mean-time-clock is on the west wall of the south arm of the Basement.

Adjoining the north wall is the table for photographic operations. Much water is used in these operations, and therefore a pump is provided in the grounds at a distance of about 30 feet from the nearest magnetometer, by which the water is withdrawn from the cistern at the east end of the photographic table and at once discharged into a covered drain.

Near the west end of the photographic table and fixed to the north wall is the Sidereal Standard Clock of the Astronomical Observatory, Dent 1906, communicating with the Chronograph and other clocks by galvanic wires. It was established in this position at the end of May 1871.

The Basement is warmed by a gas-stove, and ventilated by a large copper tube nearly two feet in diameter, receiving the flues from the stove and all the lamps, and passing through the upper room to a revolving cowl above the roof. Each of the arms of the basement has a window facing the south, but in general the window-wells are closely stopped.

The variations in the temperature of the instruments have been greatly reduced by their location within this Basement.

On the outside of the Magnetic Observatory, near the north-east corner of the ante-room, a pole 79 feet in height is fixed, for the support of the conducting wire to the electrometers; the electrometers, &c., are planted in the window-seat at the north-end of the ante-room.

The apparatus for naphthalizing the gas used in the photographic registration is mounted in a small detached zinc-built room, erected in 1863, near the west side of the ante-room. The use of the naphthalizing process, which had been discontinued in the years 1865 to 1870, has since 1871 been restored.

In 1863, a range of seven rooms, usually called the Magnetic Offices, was erected near the southern fence of the grounds, as it existed at that time; an addition, however, was made to the grounds in 1868, carrying the fence 100 feet further south. Since the summer of 1863, observations of Dip and Deflexion have been made in the westernmost of these rooms, No. 7. On 1871, December 1, the Watchman's Clock was moved from the Quadrant Passage of the Astronomical Observatory to Magnetic Office No. 3, and on 1872, November 14, it was again moved from Office No. 3 to No. 1.

At the distance of 28 feet south (magnetic) from the south-east angle of the southern arm is an open shed about $10^{ft}\ 6^{in}$ square, supported by four posts at the height of 8 feet, with an adjustible opening at the center of the roof. Under this shed are placed the large dry-bulb and wet-bulb thermometers, with a photographic cylinder, whose axis is vertical, between them; and external to these are the gas flames, whose light passing through the thermometer-tubes above the quicksilver makes photographic traces upon the paper which covers the cylinder.

For better understanding of these descriptions, the reader is referred to the Descriptions of Buildings and Grounds with accompanying Maps, attached to the Volumes of Astronomical Observations for the years 1845 and 1862.

§ 2. *Upper Declination-Magnet and Apparatus for observing it.*

The theodolite with which the meridional magnet is observed is by Simms: the radius of its horizontal circle is 8·3 inches: it is divided to 5′; and is read to 5″, by three verniers, carried by the revolving frame of the theodolite. The fixed frame stands upon three foot-screws, which rest in brass channels let into the stone pier that stands upon the brick pier rising from the ground of the Magnetic Basement. The revolving frame carries the Y's (with vertical adjustment at one end) for a telescope with transit-axis: the length of the axis is 10½ inches: the length of the telescope 21 inches: the aperture of the object glass 2 inches. The Y's are not

carried immediately by the T head which crosses the vertical axis of the revolving frame, but by pieces supported by the ends of that T head, and projecting horizontally from it: the use of this construction is to allow the telescope to be pointed sufficiently high to see δ Ursæ Minoris above the pole. The eye-piece of the telescope carries only one fixed horizontal wire, and one vertical wire moved by a micrometer-screw. The opening in the roof of the building permits the observation of circumpolar stars, as high as δ Ursæ Minoris above the pole, and as low as β Cephei below the pole.

For supporting the magnet, a braced wooden tripod-stand is provided, whose feet, as above described, rest upon slates covering brick piers in the Magnetic Basement. Upon the cross-bars of the stand rests a double rectangular box (one box completely inclosed within another), both boxes being covered with gilt paper on their exterior and interior sides. On the southern side of the principal upright piece of the stand is a moveable upright bar, turning in the vertical E. and W. plane, upon a pin in its center (which is fixed in the principal upright), and carrying at its top the pulleys for suspension of the magnet; this construction is adopted as convenient for giving an E. and W. movement (now very rarely required) to the point of suspension, by giving a motion to the lower end of the bar. The top of the upright piece carries a brass frame with two pulleys, whose axes are E. and W., adapted to carry a flat leather strap: one of these pulleys projects beyond the north side of the principal upright, and from it depends that end of the strap to which the suspension skein is attached: the other pulley projects on the south side. The strap, being brought from the magnet up to the north pulley, is carried over it and over the south pulley, and thence downwards to a small windlass, fixed to the lower part of the moveable upright. The height of the two pulleys above the floor is about 11 ft. $3\frac{3}{4}$ in., and the height of the magnet is about 2 ft. 10 in.; the length of the rod, carrying at its upper end the torsion circle, and at its lower end the cradle supporting the magnet, is 1 ft. 3 in.; and the length of strap below the north pulley is about $10\frac{3}{4}$ inches; so that the length of the free suspending skein is about 6 feet 4 inches.

The magnet was made by Meyerstein, of Göttingen: it is a bar 2 feet long, $1\frac{1}{2}$ inch broad, and about $\frac{1}{4}$ inch thick: it is of hard steel throughout. The magnet-carrier was also made by Meyerstein, but it has since been altered by Simms. The magnet is inserted sideways and fixed by a screw in the double square hook which constitutes the lower part of the magnet-carrier. This lower part turns stiffly on a vertical axis, independently of the upper part, and carries with it the graduated torsion circle: to the upper part is fixed the vernier for reading the circle. The upper part of the magnet-carrier is simply hooked into the skein.

The suspending skein was originally of silk fibre, in the state in which it is first prepared by silk manufacturers for further operations; namely, when seven or more fibres from the cocoon are united by juxtaposition only (without twist) to form a

single thread. The skein was strong enough to support perhaps three times the weight of the magnet, &c.

In the summer and autumn of 1864, an attempt was made to suspend the magnet by a steel wire, capable of supporting the weight 15 lbs.; but the torsion force was found to be so large as greatly to diminish the value of the observations; and the skein was finally restored on 1865, January 20. A similar attempt was made for suspension of the lower magnet; the skein, however, was restored on 1865, January 30.

Upon the upper magnet there slide two brass frames, firmly fixed in their places by means of pinching-screws. One of these contains, between two plane glasses, a cross of delicate cobwebs; the other holds a lens of 13 inches focal length and nearly 2 inches aperture. This combination, therefore, serves as a reversed telescope without a tube: the cross of cobwebs is seen very well with the theodolite-telescope, when the suspension-bar of the magnet is so adjusted as to place the object-glass of the reversed telescope in front of the object-glass of the theodolite, their axes coinciding. The wires are illuminated by a lamp and lens in the night, and by a reflector in the day.

In the original mounting of this magnet the small vibrations were annihilated by a copper oval or "damper," thus constructed: A copper bar, about one inch square, is bent into a long oval form, intended to contain within itself the magnet (the plane of the oval curve being vertical). A lateral bend is made in the upper half of the oval, to avoid interference with the suspension-piece of the magnet. The effect of this damper was, that after every complete or double vibration of the magnet, the amplitude of the oscillation is reduced in the proportion of 5 : 2 nearly.

On mounting the photographic magnetometer in the basement, the damper was removed from its place surrounding the upper magnet, and was adjusted to encircle the photographic magnet. The upper magnet remained unchecked in its vibrations till 1866, January 23, when the lower part of its carrier was connected with a brass bar which vibrates in water.

OBSERVATIONS RELATING TO THE PERMANENT ADJUSTMENTS OF THE UPPER DECLINATION-MAGNET AND ITS THEODOLITE.

1. Determination of the inequality of the pivots of the theodolite-telescope.

1875, August 31. The theodolite was clamped, so that the transit-axis was at right angles to the meridian. The illuminated end of the axis of the telescope was first placed to the East: the level was applied, and its scale was read; the level was then reversed, and its scale was again read; it was then again reversed, and again read, and so on successively six times. The illuminated end of the axis was then placed to the West, and the level was applied and read as before. This process was

repeated several times, and the result was, that when the level indicates the axis to be horizontal, the pivot at the illuminated end is really too low by 1″·5. Other determinations made 1875, September 21, and 1876, December 1, gave respectively 1″·3 and 1″·1. The value applied during the year 1876 to the mean level reading is $1^{\text{div}}\cdot3$ as before, equivalent to 1″·4.

2. Value of one revolution of the micrometer-screw of the theodolite-telescope.

On 1870, December 29, the magnet was made to rest on blocks of wood, and its collimator was used as a fixed mark at an infinite distance. The micrometer of the theodolite-telescope was placed in different positions, and the vertical frame carrying the telescope was then turned till the micrometer wire bisected the cross. The result of several comparisons of theodolite-readings with large values and with small values of the micrometer-reading was, that one revolution = 1′. 34″·2. Similar experiments made 1875, September 1, and December 28, gave respectively 1′. 34″·1, and 1′. 34″·2. The value used throughout the year 1876 is 1′. 34″·2.

3. Determination of the micrometer-reading for the line of collimation of the theodolite-telescope.

1875, December 28. The vertical axis of the theodolite had been adjusted to verticality, and the transit-axis was made horizontal. The declination-magnet was made to rest on blocks, and the cross-wires carried by it were used as a collimator for determining the line of collimation of the telescope of the theodolite. The telescope was reversed after each observation. The mean of 20 double observations was $100^{\text{r}}\cdot070$. On 1876, July 21, the mean of 6 double measures gave $100^{\text{r}}\cdot048$. Until July 21, the value $100^{\text{r}}\cdot070$ was used.

On 1876, July 22, the theodolite (excepting the telescope) was removed by Mr. Simms for restoration of the circle clamp. It was replaced in position on July 28.

On 1876, August 1, and 1877, January 3, the reading for the line of collimation was found, from 10 double observations on each occasion, to be $99^{\text{r}}\cdot390$ and $100^{\text{r}}\cdot064$ respectively. A change appears to have occurred early in December 1876. From July 28 to November 30, the value $99^{\text{r}}\cdot400$ was used: from December 1 to 31, the value $100^{\text{r}}\cdot064$ was used.

4. Determination of the effect of the mean-time-clock on the declination-magnet.

The observations by which this has been determined are detailed in the volumes for 1840, 1841, 1844, and 1845. It appeared that it was necessary to add 9″·41 to every reading of the theodolite. The clock was removed to the basement in 1864, having now nearly the same relative position to the lower declination-magnet which formerly it had to the upper. No correction is now applied to the upper declination-magnet.

5. Determination of the compound effects of the vertical-force-magnet and the horizontal-force-magnet on the declination-magnet.

The details applying to the effect of the horizontal-force-magnet and first vertical-

force-magnet will be found in the volumes for 1840, 1841, 1844, and 1845. It appeared that it was necessary to subtract 55″·22 from all readings of the theodolite. In 1848 a new vertical-force-magnet was introduced, and the subtractive quantity was then found to be 42″·2. A few experiments made in 1865, after removal of the horizontal and vertical force magnets to the basement, seemed to show that the correction was 36″·9, but no numerical correction has since been applied.

6. Determination of the error of collimation for the plane glass in front of the boxes of the declination-magnet.

1875, December 28. The magnet was made to rest on blocks. The micrometer head of the telescope was to the East. The plane glass has the word "top" engraved on it, and, in ordinary use, this word is always kept east. The cross-wire carried by the collimator of the magnet was observed with the engraved word alternately east and west. The result of 20 double observations was, that in the ordinary position of the glass 17″·3 is to be added to all readings. This value was used during the year 1876.

7. Determination of the error of collimation of the magnet-collimator, with reference to the magnetic axis of the magnet.

1875, December 31. Observations were made by placing the declination-magnet in its stirrup, with its collimator alternately above and below, and observing the collimator-wire by the theodolite-telescope; the windlass of the suspending skein being so moved that the collimator in each observation was in the line of the theodolite-telescope. The observation was repeated several times. The mean half excess of reading with collimator above (its usual position), over that with collimator below, was 26′. 6″·5. Observations made 1877, January 10, gave 26′. 9″·4. The mean of these values, or 26′. 8″·0, has been used during the year 1876.

8. Effect of the damper.

In the volume for 1841 observations are exhibited shewing that the oval copper bar, or damper, which then surrounded what is now the upper declination-magnet, had but little or no effect. Repeated observations, of less formal character, in succeeding years, have confirmed this result. The same bar has encircled the lower declination-magnet since the year 1865. The following observations were made in the year 1865, for ascertaining the effect of the damper on the lower declination-magnet under various circumstances.

On 1865, February 8 and 10, and March 2, the time of vibration of the magnet was observed:—

Mean of times with damper in usual position	23ˢ·888
Mean of times with damper reversed end for end	24ˢ·508
Mean of times when damper was removed	23ˢ·153

These seem to indicate a repulsion of the magnet by the damper, but the magnet came to rest so rapidly that the observations are very uncertain.

On several days from 1865, April 2 to May 12, observations were made for ascertaining the deflection of the magnet produced by turning the damper through a small angle round a vertical axis, passing through its center.

DAMPER IN USUAL POSITION.

			′ ″
Damper turned through 2°	N. end towards E.,	increase of western declination	−1. 27
	N. end towards W.,	,, ,, ,,	+1. 25
Damper turned through 4°	N. end towards E.,	,, ,, ,,	−2. 16
	N. end towards W.,	,, ,, ,,	+3. 11
Damper turned through 6°	N. end towards E.,	,, ,, ,,	−3. 10
	N. end towards W.,	,, ,, ,,	+2. 55
Damper turned through 8°	N. end towards E.,	,, ,, ,,	−1. 22
	N. end towards W.,	,, ,, ,,	+1. 45

DAMPER REVERSED END FOR END.

Damper turned through 2°	N. end towards E.,	increase of western declination	+0. 12
	N. end towards W.,	,, ,, ,,	+0. 20
Damper turned through 4°	N. end towards E.,	,, ,, ,,	0. 0
	N. end towards W.,	,, ,, ,,	+0. 26
Damper turned through 6°	N. end towards E.,	,, ,, ,,	+0. 5
	N. end towards W.,	,, ,, ,,	+0. 5
Damper turned through 8°	N. end towards E.,	,, ,, ,,	−0. 10
	N. end towards W.,	,, ,, ,,	+0. 5

The first series shews clearly that the damper in its usual position drags the magnet; the second shews no certain effect. It seems that the damper possesses two kinds of magnetism, one permanent, the other transiently induced, of nearly equal magnitude; their sum being about $\frac{1}{100}$ part of the terrestrial effect for the same deflexion.

From 1865, July 25 to August 9, observations were made to ascertain whether the effect of an external deflecting cause is the same with the damper present and the damper removed. The observation was extremely difficult, as the magnet was perpetually in vibration when the damper was removed. A small magnet on the east side of the N. end of the magnetometer, with its north end pointing towards the East (and therefore diminishing the western declination of the magnetometer), was moved to the distance (about five feet) at which it produced a deviation of 5′ nearly. The apparent western declination was observed, damper present, and damper removed. It appeared to be less with damper present than with damper removed, by 0′. 53″. The separate results are very discordant. If the conclusion has any validity, it tends to show a repulsive power in the damper, opposite to that found in the preceding experiments. This experiment is regarded as inconclusive.

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9. Calculation of the constant used in the reduction of the observations of the upper declination-magnet, the micrometer-head of the theodolite-telescope being East.

Period.	Jan. 1 to July 21.	July 28 to Nov. 30.	Dec. 1 to 31.
Reading for line of collimation	$100^{r}\cdot070$	$99^{r}\cdot400$	$100^{r}\cdot064$
Micrometer equivalent	$-2^{\circ}.\ 37'.\ 6''\cdot6$	$-2^{\circ}.\ 36'.\ 3''\cdot5$	$-2^{\circ}.\ 37'.\ 6''\cdot0$
Correction for the plane glass in front of the box, in its usual position	+ 17·3	+ 17·3	+ 17·3
The collimator above the magnet. Correction for error of collimation	− 26. 8·0	− 26. 8·0	− 26. 8·0
Constant to be used in the reduction of the observations	−3. 2. 57·3	−3. 1. 54·2	−3. 2. 56·7

10. Determination of the time of vibration of the upper declination-magnet under the action of terrestrial magnetism.

On 1873, August 7, it was found to be $31^{s}\cdot40$; on 1874, December 31, $31^{s}\cdot33$; on 1875, December 31, $31^{s}\cdot25$; and on 1877, January 10, $31^{s}\cdot21$.

11. Fraction expressing the proportion of the torsion-force to the earth's magnetic force.

By the same process which is described in the Magnetical Observations 1847, but for the silk skein at present in use, the proportion was found, on 1871, October 25, $\frac{1}{180}$; on 1871, December 28, $\frac{1}{170}$; on 1873, January 1, $\frac{1}{200}$; on 1874, January 8, $\frac{1}{182}$; on 1874, December 26, $\frac{1}{194}$; and on 1875, December 31, $\frac{1}{208}$.

DETERMINATION OF THE READINGS OF THE HORIZONTAL CIRCLE OF THE THEODOLITE CORRESPONDING TO THE ASTRONOMICAL MERIDIAN.

The reading of the circle corresponding to the astronomical meridian is determined by occasional observation of the stars Polaris and δ Ursæ Minoris when near the meridian, either above or below pole. Six measures at least are usually taken on each night of observation.

The error of the level is determined by application of the spirit-level at the time of observation: due regard being paid, in the reduction, to the inequality of pivots already found. One division of the level is considered = $1''\cdot0526$. The azimuth-reading is then corrected by this quantity:

Correction = Elevation of W. end of axis × tan. star's altitude.

The readings of the azimuth circle increase as the instrument is turned from N. to E., S., and W.; from which it follows that (telescope pointing to North), the correction must have the same sign as the elevation of the W. end.

The correction for the azimuth of the star observed has been usually computed independently in every observation, by a peculiar method, of which the principle is fully explained in the volumes for 1840-1841, 1843, 1844, 1845. The formula and table used are the following:—

Let $A_{\prime\prime}$ = seconds of arc in star's azimuth,

C_s = seconds of time in star's hour-angle,

$a_{\prime\prime}$ = seconds of arc in star's N.P.D. for the day of observation,

Then $\log. A_{\prime\prime} = \log. C_s + \log. E + \log (a_{\prime\prime} + F) + \log. \cos. \phi$.

The values of log. E, F, and log. cos. ϕ, are given in the following table:—

TABULATED VALUES of LOG. COS. ϕ, for DIFFERENT VALUES of C_s, and of the QUANTITIES LOG. E and F for the STARS POLARIS and δ URSÆ MINORIS.

Hour Angle.	Log. Cos. ϕ for			
	Polaris.	δ Ursæ Minoris.	Polaris S.P.	δ Ursæ Min. S.P.
m				
1	9·99999	9·99999	9·99999	9·99999
2	999	999	999	999
3	999	999	999	999
4	998	998	998	998
5	996	996	997	997
6	994	994	996	996
7	992	992	994	995
8	990	989	992	993
9	988	986	990	991
10	985	983	988	989
11	981	979	985	987
12	978	975	982	984
13	974	971	979	981
14	970	966	975	978
15	966	961	972	975
16	961	955	968	971
17	956	950	964	968
18	951	944	959	964
19	945	937	955	960
20	939	930	950	956
21	932	923	945	951
22	926	915	939	946
23	919	908	933	941
24	912	900	928	936
25	904	891	922	930
26	896	882	915	925
27	888	873	909	919
28	880	863	902	912
29	871	853	894	906
30	9·99862	9·99843	9·99887	9·99900
Log. E	6·09721	6·13638	−6·03899	−6·00617
F	−186″·79	−944″·71	+181″·57	+886″·86

Sometimes, when the star has been observed at larger hour angles, the azimuthal correction has been taken from a manuscript table, having for arguments "Hour Angle" and different values of "North Polar Distance."

Observations for determining the theodolite readings corresponding to the astronomical meridian were made on the following days in 1876:—January 25, 28; February 10, 29; April 3, 15, 25; May 2, 6, 11, 30; July 14; August 1, 3, 5, 8; September 1, 15; October 4, 10. 31; November 28; December 13, 21. As a check on the continued steadiness of the theodolite, observations of a fixed mark (a small hole in a plate of metal above the Observatory Library) have been taken twenty-six times at intervals through the year. The concluded mean readings for the south astronomical meridian used, were, from January 1 to July 21, 27°. 6′. 28″·5; from July 28 to November 30, 27°. 6′. 27″·7; and from December 1 to 31, 27°. 5′. 41″·5. From July 22 to 28, the theodolite was in the hands of Mr. Simms, as already mentioned.

The following is a description of the method of making and reducing the eye-observations of the declination-magnet:—

A fine horizontal wire (as stated above) is fixed in the field of view of the theodolite-telescope, and another fine vertical wire is fixed to a wire-plate, moved right and left by a micrometer screw. On looking into the telescope, the diagonally placed cross of the magnetometer is seen, and, during vibration of the magnet, will be observed to pass alternately right and left. The observation is made by turning the micrometer till its wire bisects the image of the magnet-cross at the pre-arranged times, and reading the micrometer. Then the verniers of the horizontal circle are read.

The mean-time clock is kept very nearly to Greenwich mean time (its error being ascertained each day), and the clock-time for each determination is arranged before hand. Chronometer M'Cabe 649 has usually been employed for observation.

If the magnet is in a state of disturbance, the first observation is made by the observer applying his eye to the telescope about one minute before the pre-arranged time; he bisects the magnet-cross by the micrometer wire at 45^s, and again at 15^s before that time, also at 15^s and 45^s after that time. The intervals of these four observations are the same nearly as the time of vibration of the magnet, and the mean of all the times is the same as the pre-arranged time. The times of observation are usually $1^h. 5^m$, $3^h. 5^m$, $9^h. 5^m$, and $21^h. 5^m$ of Greenwich mean time.

The mean of each pair of adjacent readings of the micrometer is taken (giving three means), and the mean of these three is adopted as the result. In practice, this is done by adding the first and fourth readings to the double of the second and third, and dividing the sum by 6.

Till 1866, January 23, the magnet was usually in a state of vibration; but, since the introduction of the water-damper on that day, the number of instances of

excessive vibration has been very small. When it appears to be nearly free from vibration, two bisections only of the cross are made, one about 15^s before the time recorded, the other about 15^s after that time, (30^s being nearly the time of a single vibration,) and the mean adopted as result. (The lower magnet, furnished with the copper damper, never exhibits any troublesome vibrations.)

The adopted result is converted into arc, supposing $1^r = 1'. 34''\cdot2$, and the quantity thus deduced is added to the mean of the vernier-readings, to which is applied the constant given in article 9 of the permanent adjustments; the difference between this number and the adopted reading for the Astronomical South Meridian is taken; and thus is deduced the magnetic declination, which is used in determining the zero for the photographic register.

§ 3. *General principle of construction of Photographic self-registering Apparatus for continuous Record of Magnetic and other Indications.*

The general principle adopted for all the photographic instruments is the same. For the register of each indication, a cylinder is provided, whose material is ebonite, and which is very accurately turned in the lathe. The axis of the cylinder is placed parallel to the direction of the change of indication which is to be registered. If there are two indications whose movements are in the same direction, both may be registered on the same cylinder; thus, the Declination and the Horizontal Force, whose indications of changes of the respective elements are both made to travel horizontally, can both be registered upon one cylinder with axis horizontal; the same remark applies to the register of two different galvanic Earth-Currents; the Vertical Force and the reading of the Barometer can both be registered upon one cylinder with axis vertical; and similarly the Dry-Bulb Thermometer and the Wet-Bulb Thermometer.

To the ends of each ebonite cylinder there are fixed circular brass plates, that which is near the clock-work having a diameter somewhat greater than that of the cylinder. In the further fittings there is a little difference between those for vertical and those for horizontal cylinders. Each horizontal cylinder has a pivot fixed in the brass plate at each end; these revolve each upon two antifriction wheels of the fixed frame. The vertical cylinders have no pivots; there is a perforation through the center of the lower or larger brass plate which, when the cylinder is mounted, is fitted upon a vertical spindle projecting upwards from the center of a second horizontal brass plate; this second brass plate sustains the weight of the vertical cylinder and turns horizontally, being supported by three antifriction wheels (each in a vertical plane) carried by the fixed frame.

Uniform rotatory motion is given to the cylinders by the action of clock-work, or rather chronometer-work, regulated by either duplex-escapement or chronometer-

escapement. For two of the cylinders, which revolve in 24 hours, and for the thermometer-cylinder which revolves in 50 hours, the axis is placed opposite to the center of the chronometer, and a fork at the end of the hour hand takes hold of a winch fixed to the plate of the cylinder, or (in the vertical cylinders) to the plate that sustains the cylinder. In the cylinder for galvanic earth-currents only, the connection is made by toothed wheels. For the horizontal cylinders, the plane of the chronometer work is vertical; for the vertical cylinders, it is horizontal. The driving chronometers for the Declination and Horizontal Force, for the Vertical Force and Barometer, and for the Thermometers, were slightly altered during the summer of the present year, 1876, for diminution of play in the driving arm. That for the Earth Currents did not require alteration.

The cylinders employed for the Declination and Horizontal Force registers, for the Vertical Force and Barometer registers, and for the Earth Current registers, are $11\frac{1}{2}$ inches high, and $14\frac{1}{4}$ inches in circumference: those for the thermometers are 10 inches high, and 19 inches in circumference.

Each cylinder is covered, when in use, by a tube of glass, which is open at one end, and has at the other end a circular plate of ebonite or brass, perforated at its center. The tube is a little larger than the cylinder; its open end is kept in position by a narrow collar of ebonite, and the opposite end by a circular piece of brass fixed to the smaller brass plate at the end of the cylinder.

To prepare the cylinder for register of indications, it is covered with a sheet of sensitised paper: the moisture on the paper usually causes the overlapping ends to adhere with sufficient firmness; the glass tube is then slipped over it, and the cylinder thus loaded is placed (if horizontal,) with its pivots in bearing upon its two sets of antifriction wheels, or, (if vertical,) with its end-brass-plate upon the rotating brass plate, and its central perforation upon the spindle of that plate; care is taken to ensure connection with the clock-work, and the apparatus is ready for action.

The trace for each instrument is produced by a flame of coal gas usually charged with the vapour of coal naphtha. For the magnetometers the light shines through a small aperture about $0^{in}\cdot3$ long, and $0^{in}\cdot01$ broad; for the earth-current-apparatus and for the barometer, the aperture is larger. The arrangements for throwing on the photographic paper of the revolving cylinder a spot of light which shall travel in the direction of the cylinder's axis with every motion of either magnetometer or galvanometer, or with the rise and fall of the mercury in the barometer, are as follows.

For each of the three magnetometers, a large concave mirror of speculum metal is carried by a part of the magnet-carrier; although it has a small movement of adjustment relative to the magnet-carrier, yet in practice it is very firmly clamped to it, so that the mirror receives all the angular movements of the magnet. The lamp above mentioned is placed slightly out of the direction of the straight line drawn from the

center of the concave mirror to the center of the cylinder which carries the photographic paper. By the concave mirror, the light diverging from the aperture is made to converge to a place nearly on the surface of the cylinder of photographic paper. The form of the aperture, however, and the astigmatism caused by the inclined reflexion from the mirror, produce this effect, that the image is somewhat elongated and is at the same time slightly curved. To diminish the length there is placed near the cylinder a system of plano-convex cylindrical lenses of glass, with their axes parallel to the axis of the cylinder, and the image is thus reduced to a neat spot of light.

For the registers of galvanic earth-currents, the light, which falls upon a plane mirror carried by each galvanometer, is made to converge to a spot by a system of cylindrical lenses.

For the barometer, the light, condensed by a vertically placed cylindrical lens, shines through a small horizontal slit in a plate of blackened mica (which moves with the fluctuations of the quicksilver), and thus forms a spot of light.

For the thermometers, the light shines through the vacant part of the tube, and thus forms a sheet of light.

The spot of light (for the magnets, the earth-currents, and the barometer), or the boundary of the line of light (for the thermometers), moves, with the movements which are to be registered, in the direction of the axis of the cylinder, while the cylinder itself is turned round. Consequently, when the paper is unwrapped from the cylinder, there is traced upon it (though not visible till the proper chemical agents have been applied) a curve, of which the abscissa measured in the direction of a line surrounding the cylinder is proportional to the time, while the ordinate measured in the direction parallel to the axis of the cylinder is proportional to the movement which is the subject of measure.

In the instruments for registering the motions of the magnets, the earth-currents, and the barometer, a line of abscissæ is actually traced on the paper, by a lamp giving a spot of light in an invariable position, the effect of which on the revolving paper is to trace a line surrounding the cylinder. For the thermometers this is not necessary, as the thermometer-scales are made to carry and to transfer to the photographic paper sufficient indications of the actual reading of the thermometers, by an apparatus which will be described in a following section.

Every part of the cylinder apparatus for the magnets and for the earth-currents is covered by cases of blackened zinc or wood, having slits for the moveable spots of light, and holes for the invariable spots; and all parts of the paths of the photographic light are protected as necessary by blackened zinc tubes from the admixture of extraneous light. The cylinder-apparatus for the thermometers is protected in the same manner, the whole, including the stems of the thermometers, and gas-lights, being enclosed in a second zinc case, blackened internally.

In all the instruments, the following method is used for attaching, to the sheet of photographic paper, indications of the time when certain parts of the photographic trace were actually made, and for giving the means of laying down a time-scale applicable to every part of the trace. By means of a small moveable plate, arranged expressly for this purpose, the light which makes the trace can at any moment be completely cut off. An assistant, therefore, occasionally cuts off the light (registering in the proper book the clock-time of doing so), and after a few minutes withdraws the plate (again registering the time). The effect of this is to make a visible interruption in the trace, corresponding to registered times. By drawing lines from these points of interruption parallel to the axis of the cylinder, to meet the photographic line of abscissæ, or an adopted line of abscissæ parallel to it, points are defined upon the line of abscissæ corresponding to registered times. The whole length of the exposed part of the paper corresponds to the known time of revolution of the cylinder. A scale being prepared beforehand, whose value for the time of revolution corresponds in length to the circumference of the cylinder, the scale-readings for the registered times of interruption of light are applied to the ordinates corresponding to the interruptions, and the divisions of hours and minutes transferred at once from the scale to the line of abscissæ. In practice it is found that the length of the paper is not always the same, and it is necessary, therefore, to use for each instrument several pasteboard scales of different lengths, adapted to various lengths of the photographic sheets.

Since the year 1870, by means of an opening made in the chimney of each of the lamps which throws light on the concave mirror, the light in each instrument falls directly upon the cylindrical lens, and, if allowed to act for a short time, produces, when developed, a dark line upon the photographic paper. An apparatus of clock-work, specially arranged by Messrs. E. Dent and Co. for this purpose, uncovers simultaneously the chimney-holes in all the lamps about $2\frac{1}{2}$ minutes before each hour, and covers them all simultaneously about $2\frac{1}{2}$ minutes after each hour. In this manner a good series of hour-lines in the direction of the ordinates is formed. The system of cutting off the trace by hand is still retained, as giving means of correcting any error in the clock, &c.; the correction thus found will be common to all the hour-lines. The accuracy of the time-registers has been much increased, and the labour of the computers much diminished, by this arrangement.

§ 4. *Lower Declination-Magnet; and Photographic self-registering Apparatus for Continuous Record of Magnetic Declination.*

The lower declination-magnet is made by Simms. It is 2 feet long, $1\frac{1}{2}$ inch broad, $\frac{1}{4}$ inch thick, of hard steel throughout, much harder than the upper declination-magnet.

The magnet-frame consists of an upper piece, whose top is a hook, (to be hooked into the suspension-skein), and which carries a concave mirror used for the photographic record in the manner described above. The lower part of this upper piece turns in a graduated horizontal circle, similar to the torsion circle of the upper magnet, and attached to the lower piece or magnet-carrier proper. The lowest part of the carrier is a double square hook, in which the magnet is inserted and is kept in position by the pressure of three screws.

It has been mentioned in § 1 that a small pier, built upon one of the crossed slates which are laid upon three piers rising from below, carries the suspension-pulleys. The suspension-skein rises to one of these pulleys, passes horizontally over a second pulley about 5 inches south of it, and then descends obliquely to a windlass which is fixed to the stone slab about 2 ft. 3 in. south of the center of the magnet. On July 23, the suspension-skein was found broken. A new skein was mounted on July 26.

The height of the pulley above the floor of the Basement is 10 ft. $4\frac{3}{4}$ in. As the height of the magnet above the floor is 2 ft. $10\frac{1}{2}$ in., and the length of the magnet frame is 1 ft. 3 in., there remains 6 ft. $3\frac{1}{4}$ in. of free suspending skein.

One of the revolving cylinders is used for the photographic record of the Declination-Magnet and the Horizontal-Force-Magnet. In the preparation of the basement in 1864, as has been stated, the south-eastern re-entering angle was cut away, so that the straight line from the suspending skein of the declination-magnet to the center of those of the bifilar magnet passes through a clear space, in which the registering apparatus is placed.

The concave mirror of the declination-magnet is 5 inches in diameter, and is above the top of the magnet-box. The distance of the light aperture from the mirror is about 25·3 inches. The bright spot formed by the reflection of light from the mirror is received on the south side of the cylinder, near its west end.

For the declination-magnet, the values, in minutes and seconds of arc, of movements of the photographic spot in the direction of the ordinate, are thus deduced from a geometrical calculation founded on the measures of different parts of the apparatus. The distance of the cylinder from the concave mirror is about 132·11 inches, and a movement of 1° of the mirror produces a movement of 2° in the reflected ray. From this it is found that 1° of movement of the mirror is represented by 4·611 inches upon the photographic paper. A small scale of pasteboard is prepared, (for which a glass scale is now substituted,) whose graduations correspond in value to minutes and seconds so calculated. The zero of the ordinate-scale is found in the following manner. The time-scale having been laid down as is already described, and actual observations of the position of the upper declination-magnet having been made with the eye and the telescope, (as has been fully described at page *xiv.*) at certain registered times, there is no difficulty (by means of

these registered times) in defining the points of the photographic trace which correspond to the observed positions. The pasteboard scale being applied as an ordinate to one of these points, and being slid up and down till the scale reading which represents the reading actually taken by the eye-observation falls on that point, the reading of the scale where it crosses the line of abscissæ is immediately found. This process rests on the assumption that the movements of the upper and lower magnets are exactly similar. The various readings given by different observations, so long as there is no instrumental change, will scarcely differ, and may be combined in groups, and thus an adopted reading for the line of abscissæ may be obtained. From this, with the assistance of the same pasteboard scale, there will be laid down without difficulty a new line, parallel to the line of abscissæ, whose ordinate would represent some whole number of degrees, or other convenient quality.

§ 5. *Horizontal-Force-Magnet and Apparatus for observing it.*

The horizontal-force-magnet, furnished by Meyerstein of Göttingen, is, like the declination-magnet, 2 feet long, $1\frac{1}{2}$ inch broad, and about $\frac{1}{4}$ inch thick. For its support (as is mentioned at page iv), a brick pier in the eastern arm of the Magnetic Observatory, built on the ground below the basement floor, rises through the floor of the upper room, and carries a slate slab, to the top of which a brass frame is attached, carrying two brass pulleys (with their axes in the same east and west line) in front of the pier, and two (in a similar position) at the back of the pier: these constitute the upper suspension-piece. A small windlass is attached to the back of the pier at a convenient height. The magnet-carrier consists of two parts. The upper part is a horizontal bar, $2\frac{1}{2}$ inches long, whose ends are furnished with verniers for reading the graduations of the torsion-circle (a portion of the lower part, to be mentioned below). On the upper side of this horizontal bar are two small pulleys with axes horizontal and at right angles to the vertical plane passing through the length of the bar: by these pulleys the apparatus is suspended, as will be mentioned. From the lower side of the horizontal bar, a vertical axis projects downwards through the center of the torsion-circle, in which it turns by stiff friction. The lower part of the magnet-carrier consists, first of the torsion-circle, a graduated circle about 3 inches in diameter: next, immediately below the central part of the torsion-circle, is attached (but not firmly fixed) a circular piece of metal from which projects downwards a frame that, by means of three cramps and screws, carries the photographic concave mirror, with the plane of its front under the center of the vertical axis: this circular piece of metal has a radial arm upon which acts a screw carried by the torsion-circle, for giving to the concave mirror small changes of azimuthal position. Thirdly, there is fixed to the torsion-circle, at the back of the mirror-frame but not

touching it, a bar projecting downwards, bent horizontally under the mirror-frame and then again bent downwards, carrying the cramps in which the magnet rests; and, still lower, a small plane mirror, to which a fixed telescope is directed for observing by reflexion the graduations of a fixed scale (to be mentioned shortly). Under the two small pulleys mentioned above passes a skein of silk; its two branches rise up and pass over the front pulleys of the suspension-piece, then over its back pulleys, and then descend and pass under a single large pulley, whose axis is attached to a wire that passes down to the windlass. Supported by the two branches of the skein, the magnet swings freely, but the direction that it takes will depend on the angular position of its stirrup with respect to the upper horizontal bar; it is intended that the index should be brought to such a position on the torsion-circle that the two suspending branches should not hang in one plane, but should be so twisted that their torsion-force will maintain the magnet in a direction very nearly E. and W. magnetic (its marked end being W.); in which state an increase of the earth's magnetic force draws the marked end towards the N., till the torsion-force is sufficiently increased to resist it; or a diminution allows the torsion-force to draw it towards the S. The magnet, with its plane mirror, hangs within a double rectangular box (one box completely inclosed within another) covered with gilt paper, similar to that used for the declination-magnet; in its south side there is one long hole, covered with glass, through which the rays of light from the scale enter to fall on the plane mirror, and the rays reflected by the mirror pass to the fixed telescope. The vertical rod (below the torsion-circle), which carries the magnet-stirrup, passes through a hole in the top of the box. Above the magnet box is the concave mirror above mentioned. The height of the brass pulleys of the suspension-piece above the floor is $11^{ft.}\ 8^{in.}{\cdot}5$; that of the pulleys of the magnet-carrier is $4^{ft.}\ 2^{in}{\cdot}5$; and that of the center of the plane mirror is about $3^{ft.}\ 1^{in.}$. The distance between the branches of the silk skein, where they pass over the upper pulleys, is $1^{in.}{\cdot}14$; at the lower part the distance between them is $0^{in.}{\cdot}80$.

An oval copper bar (exactly similar to that for the declination-magnet), embraces the magnet, for the purpose of diminishing its vibrations.

The scale, which is observed by means of the plane mirror, is in a horizontal position, and is fixed to the South wall of the East arm of the Magnetic Basement. The numbers of the scale increase from East to West, so that when the magnet is inserted in the magnet-cell with its marked end towards the West, increasing readings of the scale (as seen with a fixed telescope directed to the mirror which the magnet carries) denote an increasing horizontal force. A normal to the scale from the center of the plane-mirror meets the scale at the division 51 nearly; the distance from the center of the plane-mirror to division 51 of the scale is 90·8 inches.

The telescope is fixed on the east side of the brick pier which supports the stone pier of the declination-theodolite in the upper observing room. The angle between

the normal to the scale (which coincides nearly with the normal to the axis of the magnet) and the axis of the telescope, is about 38°, and the plane of the mirror is therefore inclined to the axis of the magnet about 19°.

OBSERVATIONS RELATING TO THE PERMANENT ADJUSTMENTS OF THE HORIZONTAL-FORCE-MAGNET.

1. Determination of the times of vibration and of the different readings of the scale for different readings of the torsion-circle, and of the reading of the torsion-circle and the time of vibration when the magnet is transverse to the magnetic meridian.

To render the process intelligible, it may be convenient to premise the following explanation.

Suppose that the magnet is suspended in its stirrup which is firmly connected with the small plane mirror, with its marked end in a magnetic westerly direction (not exactly west, but in any westerly direction between north and south), and suppose that, by means of the telescope directed towards that mirror, the scale is read, or (which is the same thing) the position of the plane mirror and of the stirrup, and therefore that of the axis of the magnet, are defined. Now let the magnet be taken out of the stirrup and replaced with its marked end easterly. The terrestrial magnetic power will now act as regards torsion, in the direction opposite to that in which it acted before, and therefore the magnet will not take the same position as before. But by turning the torsion-circle, which changes the amount and direction of the torsion-power produced by the oblique tension of the suspending cords, the magnet may be made to take the same position as at first (which will be proved by the reading of the scale, as viewed in the plane mirror, being the same). The reading of the torsion-circle will now be different from what it was at first. The effect of this operation then is, to give us the difference of torsion-circle-readings for the same position of the magnet-axis with the marked end opposite ways, but it gives no information as to whether the magnet-axis is accurately transverse to the meridian, inasmuch as the same operation can be performed whether the magnet-axis is transverse or not.

But there is another observation which will inform us whether the magnet-axis is or is not accurately transverse. Let the time of vibration be taken in each position of the magnet. Resolve the terrestrial magnetic force acting on the poles of the magnet into two parts, one transverse to the magnet, the other longitudinal. In the two positions of the magnet (marked end westerly and marked end easterly, with axis in the same position), the magnitude of the transversal force is the same, and the changes which the torsion undergoes in a vibration of given extent are the same, and the time of vibration (if there were no other force) would be the same. But

there is another force, namely, the longitudinal force; and when the marked end is northerly, this tends from the center of the magnet's length, and when it is southerly it tends towards the center of the magnet's length; and in a vibration of given extent this produces force, in one case increasing that from the torsion and in the other case diminishing it. The times of vibration therefore will be different. There is only one exception to this, which is when the magnet-axis is transverse to the magnetic meridian, in which case the longitudinal force vanishes.

The criterion then of the position truly transverse to the meridian (which position is necessary in order that the indications of our instrument may apply truly to changes of the magnitude of terrestrial magnetic force without regard to changes of direction) is this. Find the readings of the torsion-circle which, with magnet in reversed positions, will give the same readings of the scale as viewed by reflexion in the plane mirror, and will also give the same time of vibration for the magnet. With these readings of the torsion-circle the magnet is transverse to the meridian; and the difference of the readings of the torsion-circle is the difference between the position when terrestrial magnetism acting on the magnet twists it one way, and the position when the same force twists it the opposite way, and is therefore double the angle due to the torsion-force of the suspending lines when they neutralize the force of terrestrial magnetism.

The following table exhibits the elements of the determination made on 1876, January 1:—

1876. Day.	The Marked end of the Magnet. West. Torsion-Circle Reading.	West. Scale Reading.	West. Difference of Scale Readings for 1° of Torsion.	West. Mean of the Times of Vibration.	East. Torsion-Circle Reading.	East. Scale Reading.	East. Difference of Scale Readings for 1° of Torsion.	East. Mean of the Times of Vibration.
	°	div.	div.	s	°	div.	div.	s
Jan. 1	143	41·75		21·20	226	40·72		20·24
			8·33				7·54	
	144	50·08		21·04	227	48·26		20·38
			8·46				7·89	
	145	58·54		20·88	228	56·15		20·52
			7·73				8·11	
	146	66·27		20·68	229	64·26		20·66
			8·05				7·95	
	147	74·32		20·54	230	72·21		20·78
			8·19				8·68	
	148	82·51		20·42	231	80·89		20·92

The times of vibration and scale readings were sensibly the same, when the torsion-circle read 146°. 0′, marked end West, and 229°. 15′, marked end East, differing 83°. 15′. Half this difference, or 41°. 37′·5, is the angle of torsion when the magnet is transverse to the meridian. The value deduced from the whole of the observations above was 41°. 36′·9.

The value adopted in the reduction of observations through the year 1876 was 41°. 34′·25, as used in the two previous years.

The reading adopted for the torsion-circle, marked end of magnet west, was 145°. 30′ through the year.

2. Computation of the angle corresponding to one division of the scale, and of the variation of the horizontal force (in terms of the whole horizontal force) which moves the magnet through a space corresponding to one division of the scale.

It was found by accurate measurements, on 1864, November 3, that the distance from $51^{\text{div.}}$ on the scale to the center of the face of the plane mirror is 90·838 inches, and that the length of $30^{\text{div.}}\cdot85$ of the scale is exactly 12 inches: consequently the angle at the mirror subtended by one division of the scale is 14′. 43″·25, or, for change of one division of scale-reading, the magnet is turned through an arc of 7′. 21″·625.

The variation of horizontal force (in terms of the whole horizontal force) for a disturbance through one division of the scale, is computed by the formula, "Cotan. angle of torsion × value of one division in terms of radius." Using the numbers above given, the value is found to be 0·002414 through the year 1876.

3. Determination of the compound effect of the vertical-force-magnet and the declination-magnet on the horizontal-force-magnet, when suspended with its marked end towards the West.

The details of the experiments, made while the old vertical-force-magnet was in use, will be found in the volumes for 1841, 1842, 1843, 1844, 1845. The effect was to increase the readings by $0^{\text{div.}}\cdot487$. On mounting a new vertical-force-magnet in 1848, similar experiments were made, and the resulting number was $0^{\text{div.}}\cdot45$. These quantities are totally unimportant in their influence on the registers of changes of horizontal force. No experiments have been made since the magnets were placed in the basement.

4. Effect of the damper.

In the year 1865, from May 17 to May 25, observations were made for ascertaining the deflection of the magnet produced by turning the damper through a small angle round a vertical axis passing through its center.

DAMPER IN USUAL POSITION.

		div.
Damper turned through 2°	W. end towards S., increase of scale-reading	−0·251
	W. end towards N., ,, ,, ...	+0·050
Damper turned through 4°	W. end towards S., ,, ,, ...	−0·34
	W. end towards N., ,, ,, ...	+0·16

DAMPER REVERSED END FOR END.

Damper turned through 2°	W. end towards S., increase of scale-reading	−0·15
	W. end towards N., ,, ,, ...	−0·02
Damper turned through 4°	W. end towards S., ,, ,, ...	−0·12
	W. end towards N., ,, ,, ...	+0·08

On 1865, July 25, observations were made to ascertain whether the effect of an external deflecting cause is the same with the damper present and the damper removed. A small magnet was placed with its marked end pointing N. at the distance 4 feet S. of the unmarked end of the horizontal-force-magnet, deflecting the magnet through 1^{div} of the scale, and the scale-readings were observed with the damper in its usual place and the damper away. Three experiments were made, containing twenty-four observations of position. Not the smallest difference of position of the horizontal-force-magnet was produced by the presence or absence of the damper. The observations were very easy, and the result is certain.

No experiments on the damper have been made since 1865.

5. Determination of the correction for the effect of temperature on the horizontal-force-magnet.

In the Introduction to the volume of Magnetical and Meteorological Observations for 1847 will be found a detailed account of observations made in the years 1846 and 1847 for determination of this element. The principle adopted was that of observing the deflection which the magnet (to be tried) produces on another magnet; the magnet (to be tried) being carried by the same frame which carries the telescope that is directed to the plane mirror attached to the other magnet, and which also carries the scale that is viewed in these experiments by reflection in that plane mirror. The rotation of the frame was measured by a graduated circle about 23 inches in diameter. The magnet (to be tried) was always on the eastern side of the other magnet. It was enclosed in a copper trough, which was filled with water at different temperatures. One end of the magnet (to be tried) was directed towards the other magnet. The values found for correction of the results as to horizontal force determined with the magnet at temperature t° in order to reduce them to what they would have been if the temperature of the magnet had been 32°, expressed as multiples of the whole horizontal force, were,*

When the marked end of the magnet (to be tried) was West,

$$0{\cdot}00007137\ (t-32) + 0{\cdot}000000898\ (t-32)^2.$$

When the marked end of the magnet (to be tried) was East,

$$0{\cdot}00009050\ (t-32) + 0{\cdot}000000626\ (t-32)^2.$$

The mean, or

$$0{\cdot}00008093\ (t-32) + 0{\cdot}000000762\ (t-32)^2$$

has been embodied in tables which have been used in the computation of the "Reduction of Magnetic Observations 1848–1857," attached to the Volume of Observations 1859, and in the computation for "Days of Great Magnetic Disturbance 1841–1857," attached to the volume for 1862. The same formula has been employed in

* By inadvertence in printing the Introduction, 1847, the letter t has been used in two different senses.

the Reduction of Magnetic Observations 1858–1863, published in the volume for 1867.

In the year 1864 observations were made for ascertaining the temperature-coefficient by heating the magnet by hot air. The magnet, whose variation of power in different temperatures was to be determined, was placed in a copper box planted upon the top of a copper gas stove, whose heat could be regulated by manipulation of a tap, and from which rose a stream of heated air (not the air vitiated by combustion) through a large opening in the bottom of the box. The stove used for this purpose was the same which is now used for warming the Magnetic Basement. It was placed in the Magnetic Office, No. 7, in a position magnetic south of the deflexion-apparatus used in the operation for ascertaining the absolute measure of horizontal magnetic force. The hot air which rose through the opening in the center of the bottom was discharged by adjustible openings near the extreme ends of the top. Three windows were provided for reading three thermometers. The box, and the magnet which it inclosed, were placed in a magnetic E. and W. position. The needle whose deflection exhibited the power of the magnet was that which is employed in the ordinary use of the deflexion-apparatus. The proportion of the power of the magnet (under definite circumstances) to the earth's directive horizontal power was expressed by the tangent of the angle of deviation. Observations were made with temperatures both ascending and descending. The intervals of observation at different temperatures were sufficiently small to permit the assumption that the earth's force had not sensibly changed. The following is an abstract of the principal results:—

Omitting some days of less perfect series, satisfactory series of observations were made on 1864, February 21, 22, 23, and March 10. The tangents of angle of deflection were as follows:—

13	observations with	marked end E	} at mean temperature	36°·8	Fahrenheit gave	0·403711
13	"	" W				
21	"	marked end E	} "	61·3	"	0·400836
25	"	" W				
17	"	marked end E	} "	90·3	"	0·400579
16	"	" W				

From these it was inferred that the tangent of angle of deflection could be represented by—

$$0{\cdot}404559 \times \left\{1 - 0{\cdot}0004610 \times (t - 32) + 0{\cdot}000005061 \times (t - 32)^2\right\}$$

On comparing the quantity within the bracket (which expresses the law of magnetic power as depending on temperature) with that found in 1847, which, as above stated, is—

$$\left\{1 - 0{\cdot}00008093 \times (t - 32) - 0{\cdot}000000762 \times (t - 32)^2\right\}$$

it will be seen that the difference is great. The second terms differ greatly in magnitude, and the third terms in sign.

Possibly some light may be thrown on the difference by the following remark. The two formulæ give the same values for $t = 32°$ and for $t = 97°{\cdot}3$. And they give equal degrees of change per degree when $t = 65°$. It would seem therefore that the real discordance is in the experimental values for the mean temperatures only, or principally; and that it is probable that there is some error in the hot-air process for the middle temperatures.

I insert here (although not applying to the observations of the present volume) the results of a similar examination of the Old Vertical Force Magnet, which was in use from 1848 to the beginning of 1864. Omitting less perfect series, observations made on 1864, February 21 and 24, gave the following values for tangents of angles of deflection:—

7 observations with marked end E, 7 ,, ,, W	at mean temperature	34°·2	Fahrenheit	gave	0·279985
9 ,, marked end E, 11 ,, ,, W	,,	57·0	,,		0·275111
7 ,, marked end E, 7 ,, ,, W	,,	86·5	,,		0·270778

From these it was inferred that the tangent of angle of deflection could be represented by—

$$0{\cdot}280526 \times \left\{1 - 0{\cdot}00088607 \times (t - 32) + 0{\cdot}0000045594 \times (t - 32)^2\right\}$$

The expression found in 1847 for the law of force in the original Vertical Force Magnet was—

$$\left\{1 - 0{\cdot}00015816 \times (t - 32) - 0{\cdot}000001172 \times (t - 32)^2\right\}$$

giving a discordance of the same kind as that found for the horizontal force, but still larger. The formulæ agree only when $t = 32°$ and when $t = 159°{\cdot}0$. The discordance cannot be removed by a supposition similar to that made above.

Returning now to the temperature-correction of the Horizontal Force Magnet. The unsatisfactory character of the comparisons just given induced me at the beginning of 1868 to try the method of heating the air of the Magnetic Basement generally (by means of the gas-stove), leaving the magnets in all respects in their ordinary state, and comparing their indications as recorded in the ordinary way, but at different temperatures.* Experiments were at first made at intervals of a few hours in the course of one day, but it was soon found that the magnet did not acquire the proper temperature; moreover, the result was evidently affected by

* This method was first used for magnets, so far as I am aware, at the Kew Observatory. It had been used for pendulums by General Sir Edward Sabine and by myself.

diurnal inequality. After this, an entire day was in each case devoted to the effects of each temperature (high or low, as the case might be). The principal series of observations were made with the horizontal force magnet in its ordinary position, or marked end to the west; but a few were made with the marked end to the east. In some instances, the numbers given are the result each of several observations; but in other instances, the result is that of a single observation, taken when all the apparatus had acquired unusual steadiness. The following are the results:—

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE HORIZONTAL FORCE MAGNET, MARKED END WEST.

1868. Month and Day. (Civil.)		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Horizontal Force.	Change of H.F. corresponding to a change of 1° of Temperature (in Parts of the whole Horizontal Force).
		°	div.	°	div.		
January	3	56·8	60·82	6·3	0·65	0·001579	0·000250
	3	50·5	61·47				
	4	49·5	61·47	6·0	0·12	·000292	·000049
	4	55·5	61·35				
	6	59·3	60·91	10·0	0·71	·001725	·000172
	7	49·3	61·62	7·4	0·57	·001385	·000187
	9	56·7	61·05				
	10	58·9	60·91	7·6	0·80	·001943	·000256
	11	51·3	61·71	8·0	0·53	·001288	·000161
	12	59·3	61·18				
	13	59·5	61·26	5·6	0·16	·000389	·000070
	14	53·9	61·42				
	14	55·2	61·74	2·7	0·31	·000753	·000279
	16	52·5	62·05	9·0	1·27	·003086	·000343
	17	61·5	60·78	8·0	0·46	·001118	·000143
	18	53·5	61·24	6·1	0·31	·000753	·000123
	19	59·6	60·93				
January	31	60·7	58·63	10·1	0·31	·000753	·000075
February	4	50·6	58·94	9·7	0·88	·002138	·000220
	5	60·3	58·06	9·2	0·80	·001943	·000211
	7	51·1	58·86	8·5	0·82	·001992	·000234
	10	59·6	58·04				
	14	59·7	58·64	9·6	0·82	·001992	·000208
	16	50·1	59·46	9·7	0·49	·001190	·000123
	18	59·8	58·97	11·6	0·48	·001166	·000100
	20	48·2	59·45	10·6	0·43	·001045	·000099
	21	58·8	59·02				
Mean . . .		..	..	..	..	....	0·000174

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE HORIZONTAL FORCE MAGNET, MARKED END EAST.

1868. Month and Day. (Civil.)		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Horizontal Force.	Change of H.F. corresponding to a change of 1° of Temperature (in Parts of the whole Horizontal Force).
		°	div.	°	div.		
January	21	60·2	60·73	9·7	1·42	0·003449	0·000355
	22	50·5	59·31				
	24	58·6	62·56	7·3	1·02	·002477	·000339
	24	51·3	61·54	8·0	0·32	·000777	·000097
	27	59·3	61·86	10·3	0·35	·000850	·000083
	29	49·0	61·51	11·9	0·30	·000729	·000061
	31	60·9	61·81				
Mean . . .		..	...	..	..	....	0·000187

These results do not differ greatly from those which are given by application of the formula found in 1847. It is important to observe that they include the entire effects of temperature upon all the various parts of the mounting of the magnet, as well as on the magnet itself; and for this reason I think them deserving of great confidence. Still I have thought it prudent, at present, to omit application of corrections for temperature.

The method of observing with the horizontal-force-magnet is the following:—

A fine vertical wire is fixed in the field of view of the telescope, which is directed to the plane mirror carried by the magnet. On looking into the telescope, the graduations of the fixed scale, mentioned in page *xxi*, are seen; and during the oscillations of the magnet, the divisions of the scale are seen to pass alternately right and left across the wire. The clock-time, for which the position of the magnet is to be determined, is 5 minutes later than that for the observation of declination. The first observation is made by the observer applying his eye to the telescope 40^s before the arranged time, and, if the magnet is in a state of vibration, he observes the next four extreme points of vibration of the scale, and the mean of these is adopted in the same manner as for the declination-observations; but if it appears to be at rest, then at 10^s before the pre-arranged time, he notes the reading of the scale; and 10^s after the pre-arranged time he notes whether the reading continues the same, and if it does, that reading is adopted as the result. If there is a slight difference in the readings, the mean is taken. The times of observation are usually 1^h, 3^h, 9^h, and 21^h of Greenwich mean time.

The number of instances when the magnet was observed in a state of vibration during the year 1876 is very small.

Outside the double box is suspended a thermometer which is read on every week day, at 21^h, 22^h, 23^h, 0^h, 1^h, 2^h, 3^h, and 9^h. A few readings are taken on Sunday.

Self-registering maximum and minimum thermometers placed outside the box were formerly read twice every day, but in consequence of the very small diurnal range of temperature, these observations have not been continued.

§ 6. *Photographic self-registering Apparatus for Continuous Record of Magnetic Horizontal Force.*

Referring to the general description of photographic apparatus, the following remarks apply more particularly to that which is attached to the horizontal-force-magnet. A concave mirror of speculum-metal, 4 inches in diameter, is carried by the magnet-carrier. The light of a gas-lamp shines through a small aperture $0^{in}\cdot3$ high, and $0^{in}\cdot01$ broad (which is supported by the solid base of the brick pier carrying the magnet-support), at the distance of about 21·25 inches from the concave mirror, and is made to converge to a point, on the north surface and near the east end of the same revolving cylinder which receives the light from the concave mirror of the declination-magnet. A cylindrical lens parallel to the axis of the cylinder receives the somewhat elongated image of the source of light, and converts it into a well-defined spot. The motions of this spot parallel to the axis represent the angular movements of the magnet which are produced by an increase of terrestrial magnetic force overcoming more completely the torsion-force of the bifilar suspension, or by a diminution of terrestrial force yielding to the torsion-force.

As the spot of light from the horizontal-force-mirror falls on the side of the cylinder opposite to that on which the light from the declination-mirror falls, the same time-scale will not apply to both; it is necessary to prepare a time-scale independently for each.

The following is the calculation by which the scale of horizontal force on the photographic sheet is determined. The distance between the surface of the concave mirror and the surface of the cylinder is 134·436 inches; consequently, one degree of angular motion of the magnet, producing two degrees of angular motion of the reflected ray, moves the spot of light through 4·6927 inches. For the year 1876 the adopted value of variation of horizontal force for one degree of angular motion of the magnet is sin. $1^\circ \times$ cotan. $41^\circ.\ 34'\cdot25 = 0\cdot019679$; and the movement of the spot of light for 0·01 part of the whole horizontal force is 2·385 inches. With this fundamental number, the graduations of the pasteboard scale for measure of horizontal force have been prepared.

§ 7. *Vertical-Force-Magnet, and Apparatus for observing it.*

The vertical-force-magnet in use to 1848 was made by Robinson; that in use from 1848 to 1864, January 20, was by Barrow. The magnet now in use is by

Simms. Its length is $1^{ft.} 6^{in.}$; it is pointed at the ends. After some trials, it was re-magnetized by Mr. Simms on 1864, June 15. Between 1864, August 27, and September 27, a new knife-edge was attached to it, to remedy a defect which, as was afterwards found, arose from a cause that had no relation to the knife-edge. Its supporting frame rests upon a solid pier, built of brick and capped with a thick block of Portland stone, in the western arm of the magnetic basement. Its position is as nearly as possible symmetrical with that of the horizontal-force-magnet in the eastern arm. Upon the stone block is fixed the supporting frame, consisting of two pillars (connected at their bases) on whose tops are the agate planes upon which vibrate the extreme parts of the knife-edge (to be mentioned immediately). The carrier of the magnet is an iron frame, to which is attached, by clamps and pinching screws, a steel knife-edge, about 8 inches long. The steel knife-edge passes through an aperture in the magnet. The axis of the magnet is as nearly as possible transverse to the meridian, its marked end being east. The axis of vibration is as nearly as possible north and south. To the southern end of the iron frame, and projecting further south than the end of the knife-edge, is fixed a small plane mirror, whose plane makes with the axis of the magnet an angle of $52\frac{3}{4}^\circ$ nearly. The fixed telescope (to be mentioned) is directed to this mirror, and by reflexion at the surface of the mirror it views a vertical scale (to be mentioned shortly). The height of this mirror above the floor is about $2^{ft.} 10^{in.}\cdot 6$. Before the introduction of the photographic methods, the magnet was placed in a perforation of a brass frame midway between its knife-edges. But since the photographic method was introduced, the magnet has been placed excentrically; the distance of its southern face from the nearest end of the southern knife-edge being nearly 2 inches, and a space of $4\frac{1}{2}$ inches in the northern part of the iron frame being left disposable. In this disposable space there is attached to the iron frame by three clips a concave mirror of speculum-metal, with its face at right angles to the length of the magnet; it is used in the photographic system (shortly to be described). Near the north end of the iron frame are fixed in it two screw-stalks, upon which are adjustible screw-weights; one stalk is horizontal, and the movement of its weight affects the position of equilibrium of the magnet (which depends on the equilibrium between the moments of the vertical force of terrestrial magnetism on the one hand and of the magnet's center of gravity on the other hand); the other stalk is vertical, and the movement of its weight affects the delicacy of the balance, and varies the magnitude of its change of position produced by a change in the vertical force of terrestrial magnetism.

The whole is inclosed in a rectangular box. This box is based upon the stone block above mentioned; and in it, in a space separated from the rest by a thin partition, the magnet vibrates freely in the vertical plane. In the south side of the box is a hole covered by glass, through which pass the rays of light from the scale to the plane mirror, and through which they are reflected from the plane mirror to the

telescope. And at the east end is a large hole covered by glass, through which passes the light from the lamp to the concave mirror, and through which it is reflected to the photographic cylinder (to be described hereafter).

The telescope is fixed to the west side of the brick pier which supports the stone pier in the upper room carrying the declination-theodolite. Its position is symmetrical with that of the telescope by which the horizontal-force-magnet is observed; so that a person seated in a convenient position can, by an easy motion of the head left and right, observe the vertical-force and horizontal-force-magnets.

The scale is vertical: it is fixed to the pier which carries the telescope, and is at a very small distance from the object-glass of the telescope. The wire in the field of view of the telescope is horizontal. The telescope being directed towards the mirror, the observer sees in it the reflected divisions of the scale passing upwards and downwards over the fixed wire as the magnet vibrates. The numbers of the scale increase from top to bottom; so that, when the magnet is placed with its marked end towards the East, increasing readings (as seen with the fixed telescope) denote an increasing vertical force.

OBSERVATIONS RELATING TO THE PERMANENT ADJUSTMENTS OF THE VERTICAL-FORCE-MAGNET.

1. Determination of the compound effect of the declination-magnet, the horizontal-force-magnet, and the iron affixed to the electrometer pole, on the vertical-force-magnet.

The experiments applying to the magnets are given in the volumes for 1840–1841 to 1845: and those applying to the electrometer pole in the volume for 1842. It appeared that no sensible disturbance was produced on the magnet formerly in use. No experiments have been made with the new magnet.

2. Determination of the time of vibration of the vertical-force-magnet in the vertical plane.

In the year 1876, vibrations of the vertical-force-magnet were observed on 106 different days, and with readings of various divisions of the scale. The mean time of vibration adopted for the year was $14^s{\cdot}82$.

3. Determination of the time of vibration of the vertical-force-magnet in the horizontal plane.

1877, January 2–3. The magnet with all its apparatus was suspended from a tripod in Magnetic Office, No. 6, its broad side being in a plane parallel to the horizon; therefore, its moment of inertia was the same as when it is in observation. A telescope, with a wire in its focus, was directed to the reflector carried by the magnet. A scale of numbers was placed on the floor of the room, at right angles to the long axis of the magnet, or parallel to the mirror. The magnet was observed

only at times when it was swinging through a small arc. From 1,000 vibrations, the mean time of one vibration $=16^s\cdot959$. This number is used through the year 1876.

4. Computation of the angle through which the magnet moves for a change of one division of the scale; and calculation of the disturbing force producing a movement through one division, in terms of the whole vertical force.

The distance from the scale to the mirror is 186·07 inches, and each division of the scale $=\frac{12}{30\cdot85}$ inches. Hence the angle which one division subtends, as seen from the mirror, is 7′. 11″·19; and therefore the angular movement of the normal to the mirror, corresponding to a change of one division of the scale, is half this quantity, or 3′. 35″·60.

But the angular movement of the normal to the mirror is not the same as the angular movement of the magnet; but is less in the proportion of unity to the cosine of the angle which the normal to the mirror makes with the magnet, or in the proportion of unity to the sine of the angle which the plane of the mirror makes with the magnet. This angle has been found to be $52\frac{3}{4}^\circ$; therefore, dividing the result just obtained by sine $52\frac{3}{4}^\circ$, we have, for the angular motion of the magnet corresponding to a change of one division of the scale, 4′. 30″·85.

From this, the value, in terms of the whole vertical force, of the disturbing force, producing a change of one division, is to be computed by the formula, "Value of Division in terms of radius $\times$ cotan. dip $\times \frac{T'^2}{T^2}$"; where T' is the time of vibration in the horizontal plane, and T the time of vibration in the vertical plane.

For the year 1876, T' was assumed $= 16^s\cdot959$, $T = 14^s\cdot82$, dip $= 67^\circ. 40'. 52''$. From these numbers, the change of the vertical force, in terms of the whole vertical force, corresponding to one division of the scale, is found $= 0\cdot000706$.

5. Investigation of the temperature-correction of the vertical-force-magnet.

The new vertical-force-magnet was subjected to experiments by inclosing it in a copper box, and warming it by an injection of hot air, and observing the amount of deviation which it produced on the suspended magnet used in the deflexion-apparatus for absolute measure of horizontal force, at the same time and in the same manner as were the horizontal-force-magnet and the old vertical-force-magnet, in the experiments described in pages *xxvi* and *xxvii*. Observations made on 1864, February 20, 25, March 3, 9, gave, for the tangents of the angles of deflection,—

16	observations	with marked end E	at mean temperature	36·6	Fahrenheit, gave	0·172352
18	,,	,, W				
33	,,	marked end E	,,	62·2	,,	0·171657
29	,,	,, W				
26	,,	marked end E	,,	93·3	,,	0·171389
27	,,	,, W				

From these it appeared that the tangent of the angle of deflection might be represented by—

$$0\cdot172522 \times \left\{1 - 0\cdot0002233 \times (t - 32) + 0\cdot000001894 \times (t - 32)^2\right\}$$

The quantity within the brackets (which represents the variation of magnetic power in terms of the whole power of the magnet) shows the same peculiarities as those found for the other magnets; that the third term is large, and has a sign opposite to that of the second term.

The factor of variation for 1° of Fahrenheit, when $t = 62°$, is $-$ 0·0001097.

After these observations, the new vertical-force-magnet was re-magnetized by Mr. Simms, on 1864, June 15.

In the beginning of 1868, observations were made in the method already described for the horizontal-force-magnet, by heating the magnetic basement to different temperatures, and observing the scale-reading in the ordinary way. The results are as follows:—

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE VERTICAL-FORCE-MAGNET.

1868. Month and Day.		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Vertical Force.	Change of V.F. corresponding to a change of 1° of Temperature (in Parts of the whole V.F.)
		°	div.	°	div.		
January	3	56·0	56·45	7·8	9·93	0·006482	0·000831
	4	48·2	46·52	11·4	14·97	·009772	·000857
	5	59·6	61·49				
January	6	59·6	61·73	10·6	14·89	0·009720	·000917
	7	49·0	46·84	10·5	14·78	·009648	·000919
	10	59·5	61·62	9·8	12·92	·008434	·000861
	11	49·7	48·70	12·3	15·70	·010249	·000833
	12	62·0	64·40	8·6	11·07	·007226	·000840
	13	53·4	53·33	2·0	2·39	·001560	·000780
	14	55·4	55·72	3·1	4·93	·003218	·001038
	16	52·3	50·79	11·4	15·34	·010014	·000878
	17	63·7	66·13	11·3	12·87	·008402	·000743
	18	52·4	53·26	8·3	8·93	·005829	·000702
	20	60·7	62·19	10·1	14·37	·009381	·000929
	22	50·6	47·82	9·0	11·78	·007690	·000854
	23	59·6	59·60	10·0	12·93	·008441	·000844
	25	49·6	46·67	10·9	13·95	·009107	·000836
	26	60·5	60·62	11·2	15·84	·010340	·000923
	29	49·3	44·78	13·8	19·77	·012906	·000935
	31	63·1	64·55	12·1	17·44	·011385	·000941
February	4	51·0	47·11	11·3	16·91	·011039	·000977
	5	62·3	64·02	11·7	17·59	·011483	·000981
	6	50·6	46·43	2·7	2·67	·001743	·000646
	7	53·3	49·10	2·7	3·55	·002317	·000858
	8	50·6	45·55	11·5	17·21	·011235	·000977
	10	62·1	62·76				
February	14	60·6	57·70	11·6	20·95	·011298	·000974
	16	49·0	36·75	12·9	22·10	·011919	·000924
	18	61·9	58·85				
February	18	61·9	58·05	11·9	16·09	·011749	·000987
	20	50·0	41·96	12·6	14·86	·010851	·000861
	21	62·6	56·82				
Mean . .		..	..	..	..	...	0·000880

The coefficient of temperature-correction given by these experiments is enormously greater than any that has been found in any previous experiments. Yet I conceive that there can be no doubt of its accuracy. And it is easy to see that an instrument, subjected to the effects of gravity working differentially on its two ends, is liable to great changes depending on temperature which have no connection with magnetism. For instance, if the point, at which the magnet is grasped by its carrier, is not absolutely coincident with its center of gravity, a sensible change in the space intervening between the grasping point and the center of gravity, and a great change of magnetic position, may be produced by a small change of temperature. There appears to be no way of avoiding these evils but by maintaining almost uniform temperature; a condition which has been almost perfectly preserved in the year 1876. In the observations which follow, no correction is applied for temperature.

The method of observing with the vertical-force-magnet is the following:—

A fine horizontal wire is fixed in the field of view of the telescope, which is directed to the small plane mirror carried by the magnet. On looking into the telescope, the graduations of the fixed vertical scale are seen; and during the oscillations of the magnet, the divisions of the scale are seen to pass alternately upwards and downwards across the wire. The clock-time, for which the position of the magnet is to be determined, is the same as that for the horizontal force magnet. The observer applies his eye to the telescope about two vibrations before the arranged time, and if the magnet is in motion he observes its place at four extreme vibrations; and the mean of these is taken as for the horizontal-force-magnet. But if the magnet is apparently at rest, then at one-half time of vibration before the arranged time, and at an equal interval after the arranged time, the reading of the scale is noted; if the reading continues the same that reading is adopted, if there is a slight difference, the mean is taken. The times of observation are usually 1^h, 3^h, 9^h, and 21^h of Greenwich mean time.

The number of instances in 1876 in which the magnet was found in a state of vibration is very small.

Outside the box is placed a thermometer, which is read on every week day at 21^h, 22^h, 23^h, 0^h, 1^h, 2^h, 3^h, and 9^h. A few readings are taken on Sunday. Self-registering maximum and minimum thermometers were formerly read twice daily, but in consequence of the very small diurnal range of temperature these observations have not been continued.

§ 8. *Photographic self-registering Apparatus for Continuous Record of Magnetic Vertical Force.*

The concave mirror which is carried by the vertical-force-magnet is 4 inches in diameter; its mounting has been described in the last article. At the distance of about 22 inches from that mirror, and external to the box, is the horizontal aperture,

about $0^{in}{\cdot}3$ in length and $0^{in}{\cdot}01$ in breadth, carried by the same stone block which carries the supports of the agate planes. The lamp which shines through this aperture is carried by a wooden stand. The light reflected from the mirror passes through a cylindrical lens with its axis vertical, very near to the cylinder carrying the photographic paper, and finally forms a well-defined spot of light on the cylinder of paper, at the distance of 100·18 inches from the mirror. As the movements of the magnet are vertical, the axis of the cylinder is vertical. The cylinder is about $14\frac{1}{4}$ inches in circumference, being of the same dimensions as those used for the declination and horizontal-force magnets, and for the earth-currents. The forms of the exterior and interior cylinders, and the method of mounting the paper, are in all respects the same as for the declination and horizontal-force magnets; but the cylinder is supported by being merely planted upon a circular horizontal plate (its position being defined by fitting a central hole in the metallic cap of the cylinder upon a central pin in the plate), which rests on anti-friction rollers and is made by watchwork to revolve once in twenty-four hours. The trace of the vertical-force-magnet is on the west side of the cylinder.

On the east side, the cylinder receives the trace produced by the barometer (to be described hereafter). A pencil of light from the lamp which is used for the barometer shines through a fixed aperture with a small cylindrical lens, for tracing a photographic base-line upon the cylinder of paper, similar to that for the cylinder of the declination and horizontal-force magnets.

The scale for the ordinates of the photographic curve of the vertical force is thus computed. Remarking that the radius which determines the range of the motion of the spot of light is double the distance 100·18 inches, and is therefore = 200·36 inches, the formula used in the last section, when applied to $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0{\cdot}01$, gives value of division $= 200{\cdot}36 \times \tan.\ \text{dip.} \times \left(\frac{T}{T'}\right) \times 0{\cdot}01$. The value of the ordinate of the photographic curve for $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0{\cdot}01$, thus obtained, is, for the year 1876, = 3·727 inches. With this value, the pasteboard scales, used for measuring the photographic ordinates, have been prepared.

§ 9. *Dipping Needles, and Method of observing the Magnetic Dip.*

The instrument with which all the dips in the year 1876 have been observed, is that which, for distinction, is called Airy's instrument. The following description will probably suffice to convey an idea of its peculiarities:—

The form of the needles, the form of their axes, the form of the agate bearings, and the general arrangement of the relieving apparatus, are precisely the same as those in Robinson's and other needles. But the form of the observing apparatus is greatly modified, in order to secure the following objects:—

I. To obtain a microscopic view of the points of the needles, as in the instruments introduced by Dr. Lloyd and General Sir E. Sabine.

II. To possess at the same time the means of observing the needles while in a state of vibration.

III. To have the means of observing needles of different lengths.

IV. To give an illumination to the field of view of each microscope, directed from the side opposite to the observer's eye, so that the light may enter past the point of the needle into the object glass of the microscope, forming a black image of the needle-point in a bright field of view.

V. To give facility for observing by day or night.

With these views, the following form is given to the apparatus:—

The needle, and the bodies of the microscopes, are inclosed in a square box. The base of the box, two vertical sides, and the top, are made of gun-metal (carefully selected to insure its freedom from iron); but the sides parallel to the plane of vibration of the needle are of glass. Of the two glass sides, that which is next the observer is firmly fixed; it is hereafter called "the graduated glass-plate." The other glass side can be withdrawn, to open the box, for inserting the needle, &c.

An axis, whose length is perpendicular to the plane of vibration of the needles, and is as nearly as possible in the line of the axis of the needle, supported on two bearings (of which one is cemented in a hole in the graduated glass-plate, the other being upon a horizontal bar near to the agate support of the needle-axis), carries a transverse arm, about 11 inches long, or rather two arms, projecting about $5\frac{1}{2}$ inches on each side of the axis. Each of these projecting arms carries three fixed microscopes on each side, adapted in position to the lengths of the needles to be mentioned shortly.

The microscope-tube thus carried is not the entire microscope, but so much as contains the object-glass and the field-glass. Upon the plane side of the field-glass (which is turned towards the object-glass), a series of parallel lines is engraved by etching with fluoric acid. The object-glass is so adjusted that the image of the needle-point is formed upon the plane side of the field-glass; and thus the parallel lines can be used for observing the needle in a state of vibration; and, one of them being adopted as standard, the lines can be used for reference to the graduated circle (to be mentioned). All this requires that there be an eye-glass also for the microscope.

The axis of which we have spoken is continued through the graduated glass-plate, and there it carries another transverse arm parallel to the former, and generally similar to it, in which are fixed three sockets and eye-glasses. Thus, reckoning from the observer's eye, there are the following parts:—

(1.) The eye-glass.

(2.) The graduated glass-plate (its graduations, however, not intervening in this part of the glass, the graduated circle being so large as to include, within its circumference, all the microscopes).

(3.) The field-glass, on the further surface of which the parallel lines are engraved.

(4.) The object-glass.

(5.) The needle.

(6.) The removeable glass side of the box.

(7.) The illuminating reflector, to be described hereafter.

The optical part of the apparatus being thus described, we may proceed to speak of the graduated circle.

The graduations of the circle (whose diameter is about $9\frac{3}{4}$ inches) are etched on the inner surface of the graduated glass-plate. These divisions (as well as the parallel lines on the field glasses of the microscopes) are beautifully neat and regular, and are, I think, superior to any that I have seen on metal. The same piece of metal, which carries the transverse arms supporting the microscope bodies, carries also two arms with verniers for reading their graduations. These verniers (being adapted to transmitted light) are thin plates of metal, with notches instead of lines. The reading of the verniers is very easy. The portion of the axis which is external to the graduated glass-plate (towards the observer), and which has there, as already stated, two arms for carrying the microscope eye-glasses, has also two arms for carrying the lenses by which the verniers and glass-plate graduations are viewed. These four arms are the radii of a circle, which can be fixed in position by a clamp, attached to the gun-metal casing of the graduated glass-plate, and furnished with the usual slow-motion screw.

The entire system of the two arms carrying the microscope-bodies, the two arms carrying the microscope eye-glasses, the two arms carrying the verniers, and the two arms carrying the reading-glasses for the verniers, is turned rapidly by means of a button on the external side of the graduated glass-plate, or is moved slowly by means of the slow-motion screw just mentioned.

It now remains only to describe the illuminating apparatus. On the outside of the removeable glass plate, there are supports for the axis of a metallic circle turning in a plane parallel to the plane of needle-vibration. This circle has four slotted radii, which support eight small frames carrying prismatic glass reflectors, each of which can turn on an axis that is in the plane of the circle but transverse to the radius. Two of these reflectors are for the purpose of sending light through the verniers, and therefore are fixed at the same radial distance as the verniers; the other six are intended for sending light past the ends of the needle through the six microscopes, and are therefore fixed at distances corresponding to the fixed microscopes. The circle was originally turned by a small winch near the observer's hand;

at present, the winch is removed, as its axis was found to be slightly magnetic. At each observation, it is necessary to turn the circle which carries the reflectors; but this is the work of an instant.

The light which illuminates the whole is a gas-burner, in the line of the axis of rotation. Its rays fall upon the glass prisms, and each of these is adjusted, by turning on its axis, to throw the reflected light in the required direction.

The whole of the apparatus, as thus described, is planted upon a horizontal plate admitting of rotation in azimuth: the plate is graduated in azimuth, and verniers are fixed to the gun-metal tripod stand. The gas-pipe is led down the central vertical axis, and there communicates by a rotatory joint with the fixed gas-pipes.

The needles adapted for use with this instrument are—

B_1, a plain needle	each 9 inches long.
B_2, a plain needle	
B_3, a loaded needle with adjustible load	
B_4, a needle whose plane passes through the axis of the needle	
C_1, a plain needle	each 6 inches long.
C_2, a plain needle	
C_3, a loaded needle with adjustible load	
C_4, a needle whose plane passes through the axis of the needle	
D_1, a plain needle	each 3 inches long.
D_2, a plain needle	
D_3, a loaded needle with adjustible load	
D_4, a needle whose plane passes through the axis of the needle	

The needles constantly employed are B_1, C_1, D_1, B_2, C_2, D_2.

In discussing carefully the observations taken with this instrument (as well as with other dip-instruments), great trouble was sometimes experienced in determining the zenith-point (or reading of the vertical circle when the points of the needle are in the same vertical). To remedy this, a "zenith-point-needle" was constructed under my instructions by Mr. Simms; and it has since been used as need required. It is a flat bar of brass; with pivots similar to those of the dip-needles; and with three pairs of points corresponding to the three lengths of needles used; loaded at one end so as to take a position perfectly definite with respect to the direction of gravity; observed with the microscopes, and reversed for another observation, exactly as the dip-needles. For each of the different lengths of dip-needles, the zenith-point is determined by observation of that pair of points of the zenith-point-needle whose interval is the same as the length of the dip-needle.

The instrument carries two levels, one parallel to the plane of the vertical circle, the other at right angles to that plane, by means of which the instrument is from time to time adjusted in level. The readings of the first-mentioned level have for some years (since 1867) been recorded at each separate observation of dip, and since the beginning of the year 1875, these observed readings have been regularly

employed to correct the apparent value of dip for the small outstanding error of level. The instrument is maintained so nearly level that the correction usually amounts to a few seconds of arc only.

The Dip Instrument and all the needles are examined, at the close of each year, and at other times if thought desirable, by Mr. Simms.

§ 10. *Observations for the absolute Measure of the Horizontal Force of Terrestrial Magnetism.*

In the spring of 1861, a Unifilar Instrument, similar to those used in and issued by the Kew Observatory, was procured by the courteous application of General Sir Edward Sabine, from the makers, Messrs. J. T. Gibson and Son; and after having been subjected to the usual examinations, at the Kew Observatory, for determination of its constants (for which I am indebted to the kindness of Professor Balfour Stewart), was mounted at the Royal Observatory. Observations with this instrument were commenced on 1861, June 11, and the instrument is still in use.

The deflected magnet (whose use is merely to ascertain the proportion which the power of the deflecting magnet at a given distance bears to the power of terrestrial magnetism) is 3 inches long, carrying a small plane mirror. The deflecting magnet is 4 inches long; it is a hollow cylinder, carrying in its internal tube a collimator, by means of which its time of vibration is observed in another apparatus. The frame which supports the suspension-piece of the deflected magnet carries also the telescope directed to the magnet-mirror; it rotates round the vertical axis of a horizontal graduated circle whose external diameter is 10 inches. The deflecting magnet is always placed on the E. or W. side of the deflected magnet, with one end towards the deflected magnet. In the reduction of the observations, the precepts contained in the skeleton form prepared at the Kew Observatory have received the strictest attention.

The following is the explanation of the method of reduction.

The distance of the centers of the deflected and deflecting magnet being known, it is found (from observations made at Kew) that the magnetism of the deflecting magnet is so altered by induction that the following multipliers ought to be used in computing the Absolute Force:—

At distance 1·0 foot, factor is	1·00031
1·1	1·00023
1·2	1·00018
1·3	1·00014
1·4	1·00011
1·5	1·00009

The correction of the magnetic power for temperature t_0 of Fahrenheit, reducing all to 35° of Fahrenheit, is

$$0\cdot00013126\,(t_0-35)\ +0\cdot000000259\,(t_0-35)^2$$

A_1 is $\frac{1}{2}$ (distance)^3 × sine deflection, corrected by the two last-mentioned quantities, for distance 1 foot; A_2 is the similar expression for distance 1·3 foot; A'_2 is $\frac{A_2}{(1\cdot3)^2}$; P is $\frac{A_1-A_2}{A_1-A'_2}$. A mean value of P is adopted from various observations; then $\frac{m}{X}=A_1\times\left(1-\frac{P}{1}\right)$ for smaller distance, or $=A_2\times\left(1-\frac{P}{1\cdot69}\right)$ for larger distance. The mean of these is adopted for the true value of $\frac{m}{X}$.

For computing the value of mX from observed vibrations, it is necessary to know K, the moment of inertia of the magnet as mounted. The value of log. π^2K furnished by Professor Stewart is 1·66073 at temperature 30°, and 1·66109 at temperature 90°. Then putting T for the time of the magnet's vibration as corrected for induction, temperature, and torsion-force, the value of mX is $=\frac{\pi^2K}{T^2}$. From the combination of this value of mX with the former value of $\frac{m}{X}$, m and X are immediately found. In the year 1878, a new and entirely independent determination of the value of K was made. It very satisfactorily confirmed the adopted value.

It appears, from a comparison of observations given in the Introduction to the *Magnetical and Meteorological Observations*, 1862, that the determinations with the Old Instrument (in use to 1861) ought to be diminished by $\frac{1}{117}$ part, to make them comparable with those of the Kew Unifilar.

The computation of the values of m and X was, to the year 1857, made in reference to English measure only, using the foot and the grain as the units of length and weight; but, for comparison with foreign observations of the Absolute Intensity of Magnetism, it is desirable that X should be expressed also in reference to Metric measure, in terms of the millimètre and milligramme. If an English foot be supposed equal to α times the millimètre, and a grain be equal to β times the milligramme, then it is seen that, for the reduction of $\frac{m}{X}$ and mX to Metric measure, these must be multiplied by α^3 and $\alpha^2\beta$ respectively. Hence X^2 must be multiplied by $\frac{\beta}{\alpha}$, and X by $\sqrt{\frac{\beta}{\alpha}}$. Assuming that the mètre is equal to 39·37079 inches, and the gramme equal to 15·43249 grains, log. $\sqrt{\frac{\beta}{\alpha}}$ will be found to be $=9\cdot6637805$, and the factor for reducing the English values of X to Metric values will be 0·46108 or $\frac{1}{2\cdot1689}$. The values of X in Metric measure thus derived from those in English measure are given in the proper table. The value of X is sometimes required in terms of the centimètre

and gramme. This will be found by dividing the value as referred to the millimètre and milligramme by 10.

§ 11. *Explanation of the Tables of Results of the Magnetical Observations.*

The results contained in this section (so far as relates to the three magnetometers) are founded upon or derived entirely from the measures of the ordinates of the Photographic Curves.

Telescope observations of the magnetometers have usually been made four times every day, except on Sunday, on which day three observations have usually been taken. These observations have been employed for forming values of the base lines on the photographic sheets. Finally a new base line, representing a convenient reading in round numbers of the element to which it applies, has been then drawn on each sheet for convenience of further treatment. No photographic records of Declination and Horizontal Force were obtained between May 1 and 12, and between May 28 and 30, or of Vertical Force between June 19 and July 7, in consequence of their respective driving chronometers being in the hands of Messrs. Dent and Co. for alteration, as mentioned at page *xvi*. The photographs of Declination are also wanting from July 23 to July 27 in consequence of the suspension skein of the lower magnet having broken, as mentioned at page *xix*.

Before further discussing the records, the first step taken was to divide the days of observation into two groups; in one of which the magnetism was generally so tranquil that it appeared proper to use those days for determination of the laws of diurnal inequality; while in the other group the movements of the magnetic instruments were so violent, and the photographic curves traced by them so irregular, that it appeared impossible to employ them, except by the exhibition of every motion of the magnet during the day. A similar division into groups had been made in two Memoirs printed in the Philosophical Transactions. For the year 1876, one day only has been found exhibiting practically the same amount of irregularity which had been considered as defining the class of Days of Great Disturbance in the Memoirs to which I have alluded, viz.:—

February 19.

This day being separated, the photographic sheets for the remaining tranquil days were thus treated. Through each photographic curve a pencil line was drawn, representing, as well as could be judged, the general form of the curve without its petty irregularities. These pencil curves only were then used; and their ordinates were measured, with the proper pasteboard scales, at every hour. The methods of forming from these the various tables of this section require no special explanation.

The temperature of the Magnetometers was maintained in so great uniformity through each day that no appreciable error can exist in the diurnal inequalities of horizontal force and vertical force (Tables VI. and X.) in consequence of the omission of the temperature correction. It may be interesting to give the actual means for the year of the observations taken at different hours daily. These are as follows:—

	0^h.	1^h.	2^h.	3^h.	9^h.	21^h.	22^h.	23^h.
Temperature of H.F. magnet	64°·3	64°·4	64°·5	64°·6	64°·6	63°·9	64°·0	64°·1
,, V.F. magnet	64·3	64·4	64·5	64·6	64·7	63·8	63·8	64·0

It may be further stated that the inequalities in the monthly means of temperature are not sensibly greater than those here exhibited. It was, however, impossible to maintain similar uniformity of temperature through all the seasons. I have, therefore, exhibited, in Tables V. and IX., mean daily temperatures referring respectively to the daily values for horizontal and vertical force given in Tables IV. and VIII. Tables VII. and XI. similarly give mean monthly temperatures corresponding to the monthly values of the magnetic elements. It will therefore be understood that the numbers given in Tables IV., VII., VIII., and XI., are *not* corrected for temperature, but require correction corresponding to the printed temperatures.

In regard to the measurement of ordinates on disturbed days, it is only necessary to mention that the Assistant, who is charged with the translation of the curve-ordinates into numbers, remarking the salient points of the curve, or the points which if connected by straight lines would produce a polygon not sensibly differing from the photographic curve, applies to each of these the scale of pasteboard or glass proper for the element under consideration; the base of the scale determines the time on the time-scale, and the reading of the scale for the point of the photographic curve gives the quantity which is to be added to the value for the new base-line. The ordinate-reading so formed is printed without alteration in the Tables. The temperatures referring to the measures of horizontal force and vertical force on days of disturbance are given on the right-hand page of the section. As before, it is to be understood that the indications for horizontal force and vertical force are *not corrected for temperature.*

It has been the custom, in preceding volumes of the Greenwich Magnetical and Meteorological Results, to exhibit the varying Declination in the sexagesimal divisions of the circle, and the variable parts of the Horizontal Force and the Vertical Force, in terms of the whole Horizontal Force and whole Vertical Force respectively. This custom is still retained; but in the year 1872 an addition was made, carrying out the principle suggested by C. Chambers, Esq., Superintendent of the Bombay Observatory, that all the variable inequalities should be expressed in terms of Gauss's Magnetic Unit. In applying this principle, I have adopted the reference to metrical

f 2

units of measure and weight instead of British units; a change from the first proposal, which, I believe, has received the assent of Mr. Chambers. The formulæ for converting the original numbers into the new numbers are the following:—

$$\frac{\text{Variations of H. F. in metrical measure}}{\text{H. F. in metrical measure}} = \frac{\text{Variation in former measure}}{\text{Whole value in former measure}}$$

from which,

$$\text{Variation of H. F. metrical} = \frac{\text{H. F. metrical}}{\text{Former H. F.}} \times \text{ former variation.}$$

The mean value, for the year, of $\frac{\text{H. F. metrical}}{\text{Former H. F.}} = 1 \cdot 797$; and this therefore is the factor to be employed for transformation.

Similarly,

$$\text{Variation of V. F. metrical} = \frac{\text{V. F. metrical}}{\text{Former V. F.}} \times \text{ former variation.}$$

The Former V. F. (in the same manner as Former H. F.) = 1; but the V. F. metrical = H. F. metrical × tan. dip. The factor is therefore 1·797 × tan. 67°. 40′. 52″ = 4·3774.

The values given in Tables VII. and XI. and at the bottom of the left-hand page in the section of disturbed days, for the adopted zeros (in metrical units) of the variable forces, are formed by multiplying 0·8600 and 0·9600 (the adopted zeros in the former expressions) by these factors respectively.

For Variation of Declination, expressed in minutes, the metrical factor is 1·797 × sin. 1′ = 0·0005227.

In preceding years, allusion has been made to the occasional dislocations of the curve of Vertical Force. No instance of such dislocation has presented itself in 1876.

On examining the monthly values of Vertical Force in each year since the mounting of the Vertical Force Magnet which has been used since 1865, it is remarked that the value for each December is less than that for the preceding January by about $\frac{1}{100}$ part of the whole: a quantity far greater than the change deduced from the combination of Dip and Absolute Horizontal Force. This is undoubtedly caused by gradual diminution of the power of the magnet; its determination is supported by the increase in the time of horizontal vibration.

In the Tables of Results of Observations of the Magnetic Dip, the result of each separate observation of Dip with each of the six needles in ordinary use is given, and also the concluded monthly and yearly values for each needle.

The table giving the results of the observations for Absolute Measure of Horizontal Force requires no particular explanation.

§ 12. *Wires and Photographic self-registering Apparatus for continuous Record of Spontaneous Terrestrial Galvanic Currents.*

In order to obtain an exhibition of the spontaneous galvanic currents which in some measure are almost always discoverable in the earth, and which occasionally are very powerful, it was necessary to extend two insulated wires from an earth connexion at the Royal Observatory, in two directions nearly at right angles to each other, to considerable distances, where they would again make connexion with the earth. By the kindness of the Directors of the South Eastern Railway Company, to whom the Royal Observatory has on several occasions been deeply indebted, two connexions were made; one to a station near Dartford, at the direct distance $9\frac{3}{4}$ miles nearly, in azimuth (measured from North, to East, South, West), 102° astronomical or 122° magnetical, the length of the connecting wire being about $15\frac{2}{3}$ miles; the other to a station near Croydon, at the direct distance 8 miles, in azimuth, 209° astronomical, or 229° magnetical, the length of the connecting wire being about $10\frac{1}{2}$ miles. At these two stations connexion was made with earth. The details of the courses were as follows. The wires were soldered to a water pipe in the Magnetic Ground at the Royal Observatory. Thence they entered the Magnetic Basement, and passed through the coils of the galvanometers of the photographic self-registering apparatus (to be shortly described). They were then led up the electrometer mast to a height exceeding 50 feet, and thence swung across the grounds to a chimney above the Octagon Room. They descended thence, and were led to a terminal board in the Astronomical Computing Room, to which an intermediate galvanometer could be attached for eye-observation of the currents. From this point they were led to the "Battery Basement," and, with other wires, passed under the Park to the Greenwich Railway Station, and thence upon the telegraph poles of the South Eastern Railway. One wire branched off at the junction with the North Kent Railway to Dartford, the other at the junction with the main line of railway to Croydon. At both places their connexion with earth was made by soldering to water-pipes, as at the Royal Observatory.

These wires remained in the places described till the end of 1867. It had been discovered in experience that a much smaller separation of the extreme points of earth-connexion would suffice, and it was conjectured that advantage might arise from making the two earth-connexions of each wire on opposite sides of the Observatory and nearly equidistant from it, instead of making one earth-connexion of each within the Observatory grounds. In 1868, therefore, the following wire-courses were substituted. One wire is connected with earth, by a copper plate, at the Lady Well station of the Mid-Kent Railway; it is thence led to the North Kent Junction with the Greenwich Railway, to the Royal Observatory (for communication with the self-registering apparatus), back to the North Kent Junction, then by North Kent Railway and Angerstein Branch to the Angerstein Wharf, where it is

connected with earth by a copper plate. The other wire is connected with earth by a copper plate at the North Kent Junction, then passes to the Royal Observatory and back to the Junction, and then along the North Kent Railway to the Morden College end of the Blackheath Tunnel, where it is connected with earth in the same manner. The straight lines connecting the extreme points of the wires cross each other near the middle of their lengths and near the Royal Observatory; the length of the first line is nearly 3 miles, and its azimuth 56° N. to E. (magnetic); that of the second line is nearly $2\frac{1}{2}$ miles, and its azimuth 136°. But, in the circuitous courses above described, the length of the first wire is about $10\frac{3}{8}$ miles, and that of the second $6\frac{1}{4}$ miles. These wires were established and brought into use on 1868, August 20. The names and connexions of the Observatory ends of the four branches were identified in 1870; in 1871, June; again in 1872; on 1873, April 17; on 1874, April 15; and 1875, May 6.

The apparatus for receiving the effects of the galvanic currents consists essentially of two magnetic needles (one for each wire), each suspended by a hair so as to vibrate horizontally within a double galvanic coil, exactly as in an ordinary galvanometer (supposed to be laid horizontally); these coils being respectively in the courses of the two long wires. The number of folds of the wire in each coil was 150 (or 300 in the double coil of each instrument) throughout the year. A current of one kind, in either wire, causes the corresponding needle to turn itself through an angle nearly proportioned to the strength of the current, in one direction; a current of the opposite kind causes it to turn in the opposite direction. These turnings are registered by the following apparatus.

To the carrier of each magnet is fixed a small plane mirror, which receives all the azimuthal motions of the magnet. The light of a gas-lamp passes through a minute aperture, and shines upon the mirror; the divergent pencil is converted into a convergent pencil by refraction through crossed cylindrical lenses (with axes vertical before the pencil reaches the mirror, and with axes horizontal where the pencil is received from the mirror), which, under the circumstances, were more convenient than spherical lenses. A spot of light is thus formed upon the photographic paper wrapped upon a cylinder of ebonite, which is covered by a glass cylinder, and made to rotate in twenty-four hours by clock-work, exactly as for the register of the magnetic elements. As in the case of declination and horizontal-force, the two earth currents make their registers upon opposite sides of the same barrel, and upon different parts of the sheet; the same gaslight serving for the illumination of both.

A portion of a zero-line for either record is obtained at any time by simply breaking the galvanic communication.

The photograph records were regularly made, with the wires in the first position, from 1865, March 15, to the end of 1867. Fifty-three days, on which the magnetic disturbances were active, were selected for special examination; and for these the

equivalent galvanic currents in the north and west directions were computed, and their effects in producing apparent magnetic disturbances in the west and north directions were inferred. They correspond almost exactly with those indicated by the magnetometers. Then the records for all the days of tranquil magnetism were reduced in the same manner, not for comparison with the magnetometer-results, but for ascertaining the diurnal laws of the galvanic currents. These laws were found to be very different from the laws of magnetic diurnal inequalities. These discussions have been communicated to the Royal Society in two papers, printed respectively in the Philosophical Transactions for 1868 and 1870.

The records with the wires in the new positions have been regularly made since 1868, August 20, but have not yet been discussed.

§ 13. *Standard Barometer.*

The Barometer is a standard, by Newman, mounted in 1840. It is fixed on the South wall of the West arm of the Magnetic Observatory. The tube is $0^{in}\cdot565$ in diameter; the cistern is of glass. The graduated scale which measures the height of the mercury is made of brass, and to it is affixed a brass rod, passing down the inside of one of the upright supports, and terminating in a conical point of ivory; this point in observation is made just to touch the surface of the mercury in the cistern, and the contact is easily seen by the reflected and the actual point appearing *just* to meet each other. The rod and scale are made to slide up and down by means of a slow-motion screw. The scale is divided to $0^{in}\cdot05$.

The vernier subdivides the scale divisions to $0^{in}\cdot002$; it is moved by a slow-motion screw, and in observation is adjusted so that the ray of light, passing under the back and front of the semi-cylindrical plate carried by the vernier, is a tangent to the highest part of the convex surface of the mercury in the tube.

At the bottom of the instrument are three screws, turning in the fixed part of the support, and acting on the piece in which the lower pivot of the barometer-frame turns, for adjustment to verticality: this adjustment is examined occasionally.

The readings of this barometer, until 1866, August $20^d. 0^h$, are considered to be coincident with those of the Royal Society's flint-glass standard barometer. On that day a change was made in the barometer. It had been remarked that the slow-motion-screw at the bottom of the sliding rod (for adjusting the ivory point to the surface of the mercury in the cistern) was partly worn away: and on August 20 the sliding rod was removed from the barometer by Mr. Zambra to remedy this defect. It was restored on 1866, August $30^d. 3^h$. Before the removal of the sliding rod, barometric comparisons had been made with a standard barometer the property of Messrs. Murray and Heath, and with two barometers, Negretti and Zambra, Nos. 646

and 647. While the sliding rod of the Greenwich standard was removed, Negretti and Zambra 647 was used for daily observations. After the new equipment of the standard barometer, another series of comparisons with the same barometers was made: from which it was found (the three auxiliaries giving accordant results) that the readings of the barometer, in its new state, required a correction of $-0^{\text{in}}\cdot006$. This correction has been applied to every observation commencing with 1866, August 30.

The height of the cistern above the mean level of the sea is 159 feet. This element is founded upon the determination of Mr. Lloyd, in the *Phil. Trans.*, 1831; the elevation of the cistern above the brass piece inserted in a stone in the transit-room (to which Mr. Lloyd refers) being $5^{\text{ft}}.2^{\text{in}}$.

The barometer has usually been read at 21^{h}, 0^{h}, 3^{h}, 9^{h} (astronomical), and corrected by application of the index error given above. Every reading has been reduced to the reading which would have been obtained at the temperature 32° of the mercury, and corrected for expansion of the brass scale, by application of the correction given in Table II. (pages 82 to 87) of the Report of the Committee of Physics of the Royal Society. The mean of the reduced readings has then been taken for each civil day, and finally converted into mean daily reading, by application of the correction inferred from Mr. Glaisher's paper in the *Philosophical Transactions*, 1848, Part I, Table I, page 127.

In the printed record of the barometrical and all other meteorological observations, the day is to be understood, generally, as defined in civil reckoning.

§ 14. *Photographic self-registering Apparatus for continuous Record of the Readings of the Barometer.*

The Photographic self-registering Apparatus for continuous Record of Magnetic Vertical Force is furnished (as has been stated) with a vertical cylinder covered with photographic paper and revolving in 24 hours. North of the surface of this cylinder, at the distance of about 30 inches, is a large syphon barometer, the bore of the upper and lower extremities of its arms being about 1·1 inch. A glass float partly immersed in the mercury of the lower extremity is partially supported by a counterpoise acting on a light lever, leaving a definite part of the weight of the float to be supported by the mercury. This lever is lengthened to carry a vertical plate of opaque mica having a small horizontal slit, whose distance from the fulcrum is nearly eight times the distance of the point of attachment of the float wire, and whose movement, therefore, is nearly four times the movement of the column of a cistern-barometer. Through this slit the light of a lamp, collected by a cylindrical lens, shines upon the photographic paper.

The scale of time is established by means of occasional interruptions of the light, and the scale of measure is established by comparison with occasional eye-observations.

This barometer was brought into use in 1848, but its indications were not satisfactory till the mercury was boiled in the tube by Messrs. Negretti and Zambra on 1853, August 18, since which time they have appeared unexceptionable. A table showing the *Maxima and Minima of the Barometer* throughout the year, as extracted from the photographic record, is given near the end of the Meteorological Results.

A discussion of the photographic records of the Barometer from 1854 to 1873, now complete, is about to be published in a separate volume.

§ 15. *Thermometers for ordinary Observation of the Temperature of the Air and of Evaporation.*

The Dry-Bulb Thermometer, the Wet-Bulb Thermometer, the Maximum Self-Registering Thermometers, both dry and wet, and the Minimum Self-Registering Thermometers, dry and wet, all for determination of the temperature of the air and of evaporation, are mounted on a revolving frame whose fixed vertical axis is planted in the ground. From the year 1846 to 1863 the post forming the vertical axis was about 23 feet south (astronomical) of the S.W. angle of the south arm of the Magnetic Observatory; in 1863 it was moved to its present position, about 35 feet south (astronomical) of the S.W. angle. A frame revolves on this post, consisting of a horizontal board as base, of a vertical board projecting upwards from it connected with one edge of the horizontal board, and of two parallel inclined boards (separated about three inches) connected at the top with the vertical board, and at the bottom with the other edge of the horizontal board. The outer inclined board is covered with zinc. The air passes freely between all these boards.

The dry and wet-bulb thermometers are attached to the outside, and near the center of the vertical board; their bulbs are about 4 feet above the ground and projecting from 2 inches to 3 inches below the horizontal board. The maximum and minimum thermometers for air are placed towards one vertical edge, and those for evaporation towards the other vertical edge, with their bulbs at almost the same level, and near to those of the dry and wet-bulb thermometers. Above the thermometers is a small projecting roof to protect them from rain. The frame is always turned with the inclined side towards the sun. It is presumed that the thermometers are thus sufficiently protected.

The graduations of all the thermometers used in the Royal Observatory since the year 1840 rest fundamentally upon those of a Standard Thermometer, the property of Mr. Glaisher, which derives its authority from comparison with original thermo-

meters constructed by the late Rev. R. Sheepshanks about the years 1840–1843, in the course of his preparations for the construction of the National Standard of Length. The whole of the radical determinations of Freezing Point, Boiling Point, and Subdivision of Volume of Tube, were made by Mr. Sheepshanks with the utmost care: it is believed that these were the first original thermometers that had been constructed in England for many years. This thermometer continued to be the standard of reference until June of the year 1875.

By the kindness of the Kew Committee of the Royal Society, a new Kew Standard Thermometer, No. 515, was, in the year 1875, supplied to the Royal Observatory; and, commencing with the month of July of that year, all thermometers have been compared with the new standard, which will hereafter be referred to as the R. O. standard.

In order to determine whether any sensible difference exists between the indications of Mr. Glaisher's standard and those of the R. O. standard, the errors of all thermometers that, in the year 1875, had been recently referred to both standards, were collected for comparison. The details of this comparison will be found in the Introduction to the Magnetical and Meteorological Observations for 1875, page *xlviii*. The result arrived at was that the standards were practically identical.

The Dry-Bulb and Wet-Bulb thermometers are by Horne and Thornthwaite. Until November 16, the readings of the dry-bulb thermometer required a subtractive correction of 0°·5; those of the wet-bulb thermometer required corrections as follows:—

Below	54°	subtract 0°·5
Between	54 and 58°	0·4
	58 and 66	0·3
Above	66	0·2

From November 16, the dry-bulb thermometer readings required a subtractive correction of 1°·0; those of the wet-bulb thermometer required corrections as follows:—

Below	55°	subtract 0°·9
Between	55 and 70°	0·7
Above	70	0·5

The self-registering thermometers for temperature of air and evaporation are by Negretti and Zambra. The construction of the thermometers for maximum temperature is as follows.

There is a small detached piece of glass in the tube, at the bent part (near the bulb), through which the piece of glass cannot pass down. The column of mercury in rising is forced through the contraction produced by the piece of glass; but in

falling it is unable to pass the glass, and the lower mass of mercury descends into the bulb, leaving a vacant space below the glass, and a portion of the mercury above it. The piece of glass operates as an efficient valve. The thermometer used for maximum temperature of the air was No. 8527; its corrections were:—

Below	40°	subtract	0°·7
Above	40		0·8

The maximum wet bulb thermometer was No. 1575. Its corrections were as follows:—

Below	35°		0°·0
Between	35 and 40	subtract	0·1
	40 and 43		0·2
Above	43		0·3

The minimum self-registering thermometers by Negretti and Zambra are alcohol thermometers (on Rutherford's principle). A sliding glass index allows the alcohol in rising to pass above it, but is drawn down by the peculiar action of the bounding surface of the fluid when it sinks. The readings of that for minimum temperature of the air, No. 4386, required a subtractive correction of 0°·5. The minimum wet-bulb, No. 3627, required an additive correction of 0°·3.

The eye-readings of the dry-bulb and wet-bulb thermometers have usually been taken at the hours (astronomical reckoning) 21^h, 0^h, 3^h, 9^h, and corrected by application of the index errors already given. The dew-point at each of these times has then been inferred by multiplying the difference between the simultaneous readings of the dry-bulb and wet-bulb thermometers by a factor depending on the temperature of the air, and subtracting the product from the reading of the dry-bulb thermometer. These factors have been found by Mr. Glaisher from the comparison of a great number of dew-point determinations, obtained by use of Daniell's hygrometer, with simultaneous observations of dry-bulb and wet-bulb thermometers. The first part of this investigation was published in full, in the volume of *Magnetical and Meteorological Observations* for 1844, pages 67–72; it was based upon all the observations made up to that time. Subsequently, the comparison was extended to include all the simultaneous observations of these instruments made at the Royal Observatory, Greenwich, from 1841 to 1854, with some observations taken at high temperatures in India, and others at low and medium temperatures at Toronto. The results at the same temperature were found to be the same at these different localities, so far as the climatic circumstances permitted comparison. (See Glaisher's Hygrometrical Tables.) The following table exhibits the result of the entire comparison; it has been used in forming the dew-points in the present volume.

TABLE OF FACTORS by which the DIFFERENCE of READINGS of the DRY-BULB and WET-BULB THERMOMETERS is to be MULTIPLIED in order to PRODUCE the DIFFERENCE between the READINGS of the DRY-BULB and DEW-POINT THERMOMETERS.

Reading of Dry-bulb Thermometer.	Factor.	Reading of Dry-bulb Thermometer.	Factor.	Reading of Dry-bulb Thermometer.	Factor.	Reading of Dry-bulb Thermometer.	Factor.
°		°		°		°	
10	8·78	33	3·01	56	1·94	79	1·69
11	8·78	34	2·77	57	1·92	80	1·68
12	8·78	35	2·60	58	1·90	81	1·68
13	8·77	36	2·50	59	1·89	82	1·67
14	8·76	37	2·42	60	1·88	83	1·67
15	8·75	38	2·36	61	1·87	84	1·66
16	8·70	39	2·32	62	1·86	85	1·65
17	8·62	40	2·29	63	1·85	86	1·65
18	8·50	41	2·26	64	1·83	87	1·64
19	8·34	42	2·23	65	1 82	88	1·64
20	8·14	43	2·20	66	1·81	89	1·63
21	7·88	44	2·18	67	1·80	90	1·63
22	7·60	45	2·16	68	1·79	91	1·62
23	7·28	46	2·14	69	1·78	92	1·62
24	6·92	47	2·12	70	1·77	93	1·61
25	6·53	48	2·10	71	1·76	94	1·60
26	6·08	49	2·08	72	1·75	95	1·60
27	5·61	50	2·06	73	1·74	96	1·59
28	5·12	51	2·04	74	1·73	97	1·59
29	4·63	52	2·02	75	1·72	98	1·58
30	4·15	53	2·00	76	1·71	99	1·58
31	3·70	54	1·98	77	1·70	100	1·57
32	3·32	55	1·96	78	1·69		

The mean daily value of the dry-bulb thermometer given in the printed columns is found by combining two results derived from different sources. The first is the mean of the maximum and minimum readings of the self-registering thermometers, corrected by a small quantity peculiar to the day, but depending fundamentally on the corrections for the month, given in Table III. of Mr. Glaisher's paper in the *Philosophical Transactions*, 1848, page 130. The second result is formed by taking the means of the four eye-observations at 21^h, 0^h, 3^h, 9^h, and applying a correction for diurnal inequality thus investigated. The daily range being found by taking the difference between the maximum and minimum readings, this daily range is multiplied by the mean of the factors, corresponding to the hours of observation, taken from Table IV. of Mr. Glaisher's paper before mentioned; the application of the correction thus found to the mean of the eye-observations gives the second result. The two results are then combined to form the adopted mean, weights being given proportional to the number of observations contributing to each result.

For the mean daily value of the dew-point the usual process is to take the mean of the dew-points deduced from the several observations of the dry-bulb and wet-bulb

thermometers as explained above, and to apply a correction which is the mean of the corrections for the corresponding hours in Mr. Glaisher's Table VIII. In some cases the following method is used. The correction for diurnal inequality applicable to the mean of the eye-observations of the dry-bulb thermometer having been found (as described in the last paragraph), this correction is multiplied by a fraction whose numerator is the mean of the corrections to the wet-bulb thermometer for the hours of observation from Table VII., and whose denominator is the mean of the corresponding corrections to the dry-bulb thermometer from Table II.; thus a correction is found applicable to the mean of the eye-observations of the wet-bulb to form a wet-bulb reading for the day, comparable with the corresponding dry-bulb reading for the day. The difference between these being multiplied by the proper factor from the Table of Factors before given, the product is applied to the adopted value of the dry thermometer to obtain the dew point.

§ 16. *Photographic self-registering Apparatus for continuous Record of the Readings of the Dry-Bulb and Wet-Bulb Thermometers.*

About 28 feet south (magnetic) of the south-east angle of the south arm of the Magnetic Observatory, and about 25 feet east of the thermometers for eye-observations, is an open shed 10 ft. 6 in. square, standing upon posts 8 feet high, under which are placed the photographic thermometers, the dry-bulb thermometer towards the east, and the wet-bulb thermometer towards the west. The bulbs of the thermometers are 8 inches in length, and 0·4 inch internal bore, and their centers are about 4 feet above the ground. The bulb of the thermometer employed as wet-bulb is covered with muslin throughout its whole length, which is kept moist by means of capillary passage of water along cotton wicks leading from a vessel filled with water.

There are small adjustments admitting the raising or dropping of the thermometers, so that the register of their changing readings may fall on a convenient part of the paper. The thermometer frames are covered by plates having longitudinal apertures, so narrow, that any light which may pass through them is completely, or almost completely, intercepted by the broad flat column of mercury in the thermometer-tube. Across these plates a fine wire is placed at every degree; those at the decades of degrees, and also those at 32°, 52°, and 72°, being coarser than the others. A gas lamp is placed about 9 inches from each thermometer (east of the dry bulb and west of the wet bulb), and its light, condensed by a cylindrical lens, whose axis is vertical, shines through the thermometer-tube above the surface of the mercury, and forms a well-defined line of light upon the photographic paper, which is wrapped around the cylinder. The axis of this cylinder is vertical; its mounting is in all

respects similar to that of the Vertical Force cylinder. As the cylinder, covered with photographic paper, revolves under the light, which passes through the thermometer-tube, it receives a broad sheet of photographic trace, whose breadth (in the direction of the axis of the cylinder) varies with the varying height of the mercury in the thermometer-tube. Parts of the light in its passage are intercepted by the wires placed across the tube at every degree, and there are, therefore, left upon the paper corresponding lines in which there is no photogenic action.

The cylinder was at first made to revolve in 48 hours; the daily photographic traces of the two thermometers were thus simultaneously registered on opposite sides of the cylinder, sometimes slightly intermixing. The length of the glass cylinder used till 1869, March, is $13\frac{1}{2}$ inches, and its circumference is about 19 inches. On 1869, March 5, an ebonite cylinder was introduced, whose length is 10 inches, and circumference about 19 inches; and at a later time the cylinder was made to revolve in 50 hours instead of 48 hours, to insure the separation of the records of the two thermometers.

The photographic records of the dry-bulb and wet-bulb thermometers have been discussed from 1848 to 1868. The results exhibit the diurnal inequality of the temperature of the air and of evaporation, as grouped by months, as grouped by periods of high and low temperature, as grouped by periods of high and low atmospheric pressure, as grouped by cloudless or overcast sky, and as grouped by directions of the wind. These results are now complete, and will be published with the Barometer results spoken of at page *xlix*.

§ 17. *Thermometers for Solar Radiation and Radiation to the Sky.*

The thermometer for Solar Radiation, which to the end of the year 1864 was placed in an open box about 10 feet south of the south-west angle of the south arm of the Magnetic Observatory, is now laid on the grass, near the same place.

The thermometer is a self-registering maximum mercurial thermometer of Negretti and Zambra's construction (No. 5964); its bulb is blackened, and enclosed in a glass sphere from which the air has been exhausted. Its graduations are correct, and the numbers inserted in the tables are those read from the instrument without alteration. The thermometer is read at 9^h a.m., noon, 3^h p.m., and 9^h p.m.; the highest of these readings is adopted as the maximum for the day.

The use of a thermometer with blackened bulb not inclosed in an exhausted sphere was discontinued at the end of 1865.

The thermometer for radiation to the sky is placed near to the Solar Radiation thermometer, with its bulb resting on short grass, and fully exposed to the sky. It is a self-registering minimum spirit thermometer of Rutherford's construction, Horne

and Thornthwaite, No. 3120. Its graduation is correct, and the numbers inserted in the table are those read from the scale without alteration. It is read every day at 9^h a.m., and occasionally at 9^h p.m.

§ 18. *Thermometers sunk below the Surface of the Soil at different Depths.*

These thermometers were made by Messrs. Adie of Edinburgh, under the immediate superintendence of the late Professor J. D. Forbes. The graduation was made by Professor Forbes himself.

The thermometers are four in number. They are all placed in one hole in the ground, the diameter of which in its upper half is 1 foot, and in its lower half about 6 inches. Each thermometer is attached in its whole length to a slender piece of wood, which is planted in the hole with it. The place of the hole is 20 feet south (magnetic) of the extremity of the south arm of the Magnetic Observatory, and opposite the center of its south front.

The soil consisted of beds of sand; of flint-gravel with a large proportion of sand; and of flints with a small proportion of sand, cemented almost to the consistency of pudding-stone. Every part of the gravel and sand extracted from the hole was perfectly dry.

The bulbs of the thermometers are cylindrical, 10 or 12 inches long and 2 or 3 inches in diameter. The bore of the principal part of the tubes, from the bulb to the graduated scale, is very small. In that part to which the scale is attached, the tube is larger.

The thermometer No. 1 was dropped into the hole to such a depth that the center of its bulb was 24 French feet (25·6 English feet) below the surface: then dry sand was poured in till the hole was filled to nearly half its height. Then No. 2 was dropped in till the center of its bulb was 12 French feet below the surface; No. 3 and No. 4 till the centers of their bulbs were respectively 6 and 3 French feet below the surface; and the hole was then completely filled with dry sand. The upper parts of the tubes, carrying the scales, were left projecting above the surface: No. 1 by 27·5 inches, No. 2 by 28·0 inches, No. 3 by 30·0 inches, and No. 4 by 32·0 inches. Of these lengths, the parts 8·5, 10·0, 11·0, and 14·5 inches, respectively, are tube with narrow bore.

The projecting parts of the tubes are protected by a wooden case or box fixed to the ground; the sides of the box are perforated with numerous holes, and it has a double roof. In the North face of this box is a large plate of glass through which the thermometers are read. Within the box are two smaller thermometers, one (No. 5) whose bulb is sunk one inch in the ground, and one (No. 6) whose bulb is in the free air nearly in the center of the box.

The fluid of the four long thermometers is alcohol tinged with a red colour.

The lengths of 1° on the scales of Nos. 1, 2, 3 and 4, are respectively about 1·9 inch, 1·1 inch, 0·9 inch, and 0·5 inch; and the ranges of the scales, as first mounted, were, 43°·0 to 52°·7, 42°·0 to 56°·8, 39°·0 to 57°·5, and 34°·2 to 64°·5.

These ranges for Nos. 2, 3, and 4, were found to be insufficient in some years, particularly those of Nos. 3 and 4, or the thermometers sunk to the depth of 6 feet and 3 feet.

In 1857, June 22, Messrs. Negretti and Zambra removed from Nos. 3 and 4 a quantity of fluid corresponding to the extent of 5° on their scales, and the scales of these two thermometers were then lowered by that linear extent, making the readings the same as before.

In subsequent years it was found that the amount of fluid removed was somewhat too great, for at the lower end of the scale the 6-foot thermometer sometimes fell below the limit of its scale or 44°; and the 3-foot thermometer below 39°·0; in which cases the alcohol sank into the capillary tube.

The readings at the early part of the series were at times defective at high temperatures, but always complete at low temperatures; afterwards, they were generally complete at high temperatures, and at times defective at low temperatures. The two combined, however, will enable us to complete all readings.

On 1869, July 21, Mr. Zambra removed fluid from No. 1 to the amount of 2°·7, and from No. 2 to the amount of 1°·5, and inserted in No. 4 fluid to the amount of 1°·5. The scales were re-engraved, to make the reading at every temperature the same as before.

The ranges of the scales are now,—for No. 1, 46°·0 to 56°·0; for No. 2, 43°·0 to 58°·0; for No. 3, 44°·0 to 62°·0; and for No. 4, 37°·0 to 67°·5.

These thermometers are read once a day, at noon, and the readings appear in the printed volumes as read from their scales without correction.

The observations of these thermometers from 1846 to 1859 have been elaborately reduced by Professor Everett; the results are printed as an Appendix to the Greenwich Observations for 1860. Abstracts of the observations of these thermometers (giving mean monthly temperatures) for the period 1847 to 1873 have since been prepared, and will be printed with the results of the discussion of the dry and wet bulb thermometer records, spoken of at page *liv*.

§ 19. *Thermometers immersed in the Water of the Thames.*

The self-registering maximum and minimum thermometers for determining the highest and lowest temperatures of the water of the Thames are observed every day at 9h a.m.

The thermometers were originally attached to the side of the "Dreadnought" hospital ship. Commencing with 1871, January 12, they were attached to the Police Ship "Scorpion," moored in Blackwall Reach. In the month of May 1874, the wooden trunk was shifted from the "Scorpion" to the "Royalist," moored in the same place. The first readings with the thermometers in the new position were taken 1874, May 5.

A strong wooden trunk is firmly fixed to the side of the "Royalist," about 5 feet in height, and closed at the bottom; the bottom and the sides, to the height of 3 feet, are perforated with a great number of holes, so that the water can easily flow through; the thermometers are suspended within this trunk so as to be about 2 feet below the surface of the water, and 1 foot from the bottom of the trunk.

The observations have been made by the Resident Inspector on board, by permission of Lieut.-Col. Henderson, R.E., C.B., Commissioner of Metropolitan Police.

The thermometer used for maximum temperature (a thermometer on Phillips's principle) is Horne and Thornthwaite, No. 22242; that for minimum temperature is Horne and Thornthwaite, No. 22243. Both thermometers required an additive correction of $0^{\circ}\cdot 3$.

§ 20. *Osler's Anemometer.*

This anemometer is self-registering: it was made by Newman, on a plan furnished by A. Follett Osler, Esq., F.R.S., but has received several changes since it was originally constructed. A large vane, which is turned by the wind, and from which a vertical spindle proceeds down nearly to the table in the north-western turret of the ancient part of the Observatory, gives motion by a pinion upon the spindle to a rack-work carrying a pencil. This pencil makes a mark upon a paper affixed to a board which is moved uniformly in a direction transverse to the direction of the rack-motion. The movement of the board is effected by means of a second rack connected with the pinion of a clock. The paper has lines printed upon it corresponding to the positions which the pencil must take when the direction of the vane is N., E., S., or W.; and also has transversal lines corresponding to the positions of the pencil at every hour. The first adjustment for azimuth was obtained by observing from a certain point the time of passage of a star behind the vane-shaft, and computing from that observation the azimuth: then on a calm day drawing the vane by a cord to that position, and adjusting the rack, &c., so that the pencil position on the sheet corresponded to that azimuth.

This construction originally arranged by Mr. Osler was in use till the middle of 1866, when the following modifications were made in it by Mr. Browning:—

The vane-shaft was made to bear upon anti-friction-rollers running in a cup of oil.

For elucidation of the following description of the apparatus which it carries, I refer to Figure 3 on the engraving at the end of the Introduction to the volume of 1866. To the vane-shaft is attached a rectangular frame C, which rotates with the vane. To this frame are firmly attached the ends of four strong springs D, which rise from the point of attachment in a vertical direction, are then bent so as to descend below the frame C, and are then bent upwards so as to rise a short distance, where they terminate, each of them thus forming a large hook. To the interior of each strong spring, near to its upper bend, is affixed a very weak spring, which descends free into the lower bend or hook of the strong spring, so that its lower end may be moved by a light pressure till it reaches and takes bearing against the bent-up part of the strong spring, after which it cannot be further moved without moving the strong spring, and will therefore require much greater pressure. The four ends of these four light springs carry the circular pressure-plate A by the following connexions. The two which are farthest from A, or which are below the wide part of the vane, are united by a light horizontal cross-bar G; and from the ends of these springs proceed four light bars E, which are attached to points of the pressure-plate A, near its circumference. The two ends of light springs which are nearest to A are also united by a light horizontal cross bar, which is attached to a projection from the center of the plate A. (The diagonal lines upon A, in the diagram, represent indistinctly two strengthening edge-bars upon the pressure-plate, and the projection above mentioned is fixed to their intersection.) The weight of the pressure-plate thus rests entirely on the slender springs; it is held steadily in position, as regards the opposition to the wind, and it moves without sensible friction. A light wind drives it through a considerable space, until the ends of one pair of light springs touch their large hooks; then for every additional pound of pressure the movement is smaller, till the ends of the other pair of light springs touch their large hooks: after this the movement for every additional pound of pressure is still further diminished. This apparatus was arranged by Mr. Browning. The communication with the pencil below is similar to that in the first construction: the cord and pulley are omitted in the drawing to avoid confusion.

The pressure-pencil below is carried by a radial bar, whose length is parallel to the scale of hours; it is brought to zero by a light spring.

The surface of the pressure-plate is 2 square feet, or double that in the old construction. The scale of indications on the recording sheet was determined experimentally as in the old instrument; yet it was remarked that the pressures of wind per square foot appeared generally greater than formerly. It was suspected that the inertia of the tension-weight acting against the pressure-spring, and that of the pencil-weight, may have produced an injurious effect: both these weights were replaced by springs, 1872, February 21. The pencil-spring has since been removed and weight applied as necessary.

The scale for small pressures is much larger, and their indications much more certain than formerly. A pressure of an ounce per square foot is clearly shown.

A rain gauge of peculiar construction is carried by this instrument, by which the fall of rain is registered with reference to the time of the fall. It is described in § 22.

A fresh sheet of paper is applied to this instrument every day at 22^h mean solar time.

§ 21. *Robinson's Anemometer.*

In the latter part of the year 1866, a new instrument, on the principles described by Dr. Robinson in the Transactions of the Royal Irish Academy, vol. xxii., adapted to give a continuous record of the velocity of the wind, was mounted by Mr. Browning, of which the principal parts are represented in Figures 1 and 2 of the engraving in the Introduction 1866. The motion is given (as in the former instrument) by the pressure of the air on four hemispherical cups, the distance of the center of each from the axis of rotation being 15·00 inches. The foot of the axis is a hollow flat cone bearing upon a sharp cone which rises up from the base of a cup of oil. The horizontal arms are connected with a vertical spindle, upon which is an endless screw working in a toothed wheel connected with a train of wheels, furnished with indices capable of registering one mile and decimal multiples of a mile up to 1,000 miles. A pinion C upon the axis of one of the wheels (which, in the figure, occupies a place too high) acts in a rack J, drawing it upwards by the ordinary motion of the revolving cups. The rack is pressed to the pinion by a spring, and, when it has been drawn up, it can be pressed by hand in opposition to the spring so as to release it from the pinion, and can then be pushed down, again to be raised by the action of the wheel-work. The rack is connected at the bottom with a sliding rod D, which passes down into the chamber below, where it draws up the sliding pencil-carrier E. The pencil F, which it carries, traces its indications upon the sheet of paper wrapped round a barrel, whose axis is vertical, and which by spindle connexion with the clock H is made to revolve in 24 hours. The revolving cups and wheel-work are so adjusted that a motion of the pencil upwards of one inch represents a motion of the air through 100 miles. The curve traced upon the barrel exhibits, therefore, the aggregate of the air's movements, and also the air's velocity, at every instant of the day.

In the year 1860, on July 3, 4, and 13, experiments were made in Greenwich Park, with the instrument then in use, to ascertain the correctness of the theory of Robinson's anemometer; the point to be verified being that the scale of the instrument, founded on the supposition that the horizontal motion of the air is about three times the space described by the centers of the cups, is correct.

A post about 5 feet high with a vertical spindle in the top was erected, and on this spindle turned a horizontal arm, carrying at the extremity of its longer portion

Robinson's anemometer, and on its shorter portion a counterpoise. The distance from the vertical spindle of the post to the vertical axis of the anemometer was $17^{ft.}\ 8^{in.}\cdot 7$. The reading of the dial was taken, and then the arm was made to revolve in the horizontal plane 50 or 100 times, an attendant counting the number of revolutions, and the reading of the dial was again taken. In this manner 1,000 revolutions were made in the direction N.E.S.W.N., and 1,000 revolutions in the direction N.W.S.E.N. In some of the experiments the air was sensibly quiet, and in others there was a little wind; the result was,

For a movement of the instrument through one mile,

Beam revolving N.E.S.W. (opposite to the direction of rotation of the Anemometer-cups)	1·15 was registered.
Beam revolving N.W.S.E. (in the same direction as the Anemometer-cups)	0·97 was registered.

The results from rapid revolutions and from slow revolutions were sensibly the same.

This may be considered as sufficiently confirming the accuracy of the theory.

§ 22. *Rain Gauges.*

The rain-gauge connected with Osler's anemometer is 50 feet 8 inches above the ground, and 205 feet 6 inches above the mean level of the sea. It exposes to the rain an area of 200 square inches (its horizontal dimensions being 10 by 20 inches).

The collected water passes through a tube into a vessel suspended in a frame by spiral springs, which lengthen as the water increases, until 0·25 of an inch is collected in the receiver; it then discharges itself by means of the following modification of the syphon. A copper tube, open at both ends, is fixed in the receiver, in a vertical position, with its end projecting below the bottom. Over the top of this tube a larger tube, closed at the top, is placed loosely. The smaller tube thus forms the longer leg, and the larger tube the shorter leg, of a syphon. The water, having risen to the top of the smaller tube, gradually falls through it into the uppermost portion of a tumbling bucket, fixed in a globe under the receiver. When full, the bucket falls over, throwing the water into a small pipe at the lower part of the globe; the water completely fills the bore of the pipe; its descent causes an imperfect vacuum in the globe, sufficient to cause a draught in the longer leg of the syphon, and the whole contents run off. After leaving the globe, the water is carried away by a waste-pipe attached to the building. The springs then shorten and raise the receiver. The ascent and descent of the water-vessel move a radius-bar which carries a pencil; and this pencil makes a trace upon the paper carried by the sliding board of the self-registering anemometer. As the trace is rather long in proportion

to the length of the radius-bar, the bar has now been furnished by Mr. Browning with a "parallel motion," which makes the trace sensibly straight.

The scale of the printed paper was adjusted by repeatedly filling the water-vessel until it emptied itself, then weighing the water, and thus ascertaining its bulk, and dividing this bulk by the area of the surface of the rain receiver.

A second gauge, with an area 77 square inches nearly, is placed close to the preceding, the receiving surface of both being on the same horizontal plane.

A third gauge is placed on the roof of the Octagon room, at 38 feet $4\frac{1}{2}$ inches above the ground, and 193 feet $2\frac{1}{2}$ inches above the mean level of the sea. It is a simple cylinder gauge, 8 inches in diameter and about $50\frac{1}{4}$ square inches in area. The height of the cylinder is $13\frac{1}{2}$ inches; at the depth of 1 inch from the top within the cylinder is fixed a funnel (an inverted cone) of 6 inches perpendicular height; with the point of this funnel is connected a tube, $\frac{1}{5}$ of an inch in diameter, and $1\frac{1}{2}$ inch in length; $\frac{3}{4}$ of an inch of this tube is slightly curved, and the remaining $\frac{3}{4}$ of an inch is bent upwards, terminating in an aperture of $\frac{1}{8}$ of an inch in diameter. By this arrangement, the last few drops of water remain in the bent part ot the tube, and the water is some days evaporating. The upper part of the funnel or bore of the cone is connected with a brass ring, which has been turned in a lathe, and this is connected with a circular piece 6 inches in depth, which passes outside the cylinder, and rests in a water joint, attached to the inner cylinder, and extending all round.

A fourth gauge is placed on the top of the Library; it is a funnel, whose top has a diameter of 6 inches; its exposed area is $28\frac{1}{4}$ square inches nearly. The receiving surface of the gauge is 22 feet 4 inches above the ground, and 177 feet 2 inches above the mean level of the sea.

A fifth gauge is planted on the roof of the Photographic Thermometer shed, 10 feet above the ground, and 164 feet 10 inches above the mean level of the sea. Its construction is the same as that of the third gauge.

A sixth gauge is a self-registering rain-gauge on Crosley's construction, made by Watkins and Hill. The surface exposed to the rain is 100 square inches. The collected water falls into a vibrating bucket, whose receiving concavity is entirely above the center of motion, and which is divided into two equal parts by a partition whose plane passes through the axis of motion. The pipe from the rain-receiver terminates immediately above the axis. Thus that part of the concavity which is highest is always in the position for receiving water from the pipe. When a certain quantity of water has fallen into it, it preponderates, and, falling, discharges its water into a cistern below; then the other part of the concavity receives the rain, and after a time preponderates. Thus the bucket is kept in a state of vibration. To its axis is attached an anchor with pallets, which acts upon a toothed wheel by a process exactly the reverse of that of a clock-escapement. This wheel communicates motion to a train of wheels, each of which carries a hand upon a dial-plate; and thus

inches, tenths, and hundredths are registered. Sometimes, when the escapement has obviously failed, the water which has descended to the lower cistern has again been passed through the gauge, in order to enable an assistant to observe the indication of the dial-plates without fear of an imperfection in the machinery escaping notice. The gauge is placed on the ground, 21 feet South of the Magnetic Observatory, and 156 feet 6 inches above the mean level of the sea.

The seventh and eighth gauges are placed near together, about 16 feet south of the Magnetic Observatory, 5 inches above the ground, and 155 feet 3 inches above the mean level of the sea. They are similar in construction and area to No. 3. These cylinders are sunk about 8 inches in the ground.

Another gauge (the ninth) was established at the end of the year 1875 at the Police ship "Royalist." Its receiving surface is 17 feet above the level of the river. It was brought into use on 1876, January 1.

All these gauges, except No. 8, are read at 21^h daily; in addition, Crosley's gauge and No. 7 are read daily at 9^h, and No. 8 at the end of each month only, to check the summation of the daily readings of No. 7. All are read at midnight of the last day of each month.

§ 23. *Electrical Apparatus.*

The electrical apparatus consists of two parts, namely, the Moveable Apparatus, which is connected with a pole nearly 80 feet high, planted 7 feet North and 2 feet East of the north-east angle of the north arm of the Magnetic Observatory (as extended in 1862); and the Fixed Apparatus, which is mounted in a projecting window in the ante-room of the Magnetic Observatory.

On the top of the pole is fixed a projecting cap, to which are fastened the ends of two iron rods, which terminate in a pit sunk in the ground, and are kept in tension by attached weights. These rods are to guide the moveable apparatus in its ascents and descents. Near the bottom of the pole is fixed a windlass; the rope upon which it acts passes over a pulley in the cap, and is used to raise the moveable apparatus, which when raised to the top is suspended on a hook.

The moveable apparatus consists of the following parts:—A plank in a nearly vertical position is attached to perforated iron bars, which slide upon the iron rods. On the upper part of this plank is a cubical box. The box incloses a stout pillar of glass, having a conical hollow in its lower part. In the bottom of the box there is a large hole through which a cone of copper passes into the conical hollow of the glass pillar. In the lower part of the box a gas-lamp is placed, by the flame of which the copper cone and the lower part of the glass pillar are kept in a state of warmth. The gas lamp is lighted when necessary by means of a sliding frame,

carrying a torch similar to that of ordinary lamplighters, which can be easily raised to the box; and there are very few losses of electrical indications from the failure of the lamp. A copper wire is fastened round the glass pillar; its end is carried to a similar glass pillar, warmed in the same manner, near the north-western turret of the Octagon room; by this wire, whose length is about 400 feet, the atmospheric electricity is collected. To this wire, near the box, is attached another copper wire (now covered with gutta percha) 0·1 inch in diameter, and about 73 feet long, at the end of which is a hook; a loaded brass lever connected with the fixed apparatus presses upon this hook, and thus keeps the wire in a state of tension, and at the same time establishes the electrical communication between the long horizontal wire and the fixed apparatus.

On 1871, November 17, the box which carries the insulating glass pillar was burnt. It seems possible that this accident was caused by soot deposited during gusty weather, which afterwards caught fire from the lamp. A copper box was substituted for the wooden box on 1872, January 2.

The fixed apparatus consists of these parts:—A glass bar, nearly 3 feet long, and thickest at its middle, is supported in a horizontal position, its ends being fixed in pieces of wood projecting downwards from the roof of the projecting window. Near to each end is placed a small gas-lamp, whose chimney encircles the glass, and whose heat keeps the glass in a state of warmth proper for insulation. A brass collar surrounds the center of the glass bar; it carries one brass rod, projecting vertically upwards through a hole in the roof of the window recess, to which rod are attached a small metallic umbrella and the loaded lever above mentioned; and it carries another rod projecting vertically downwards, to which is attached a horizontal brass tube in an East and West direction. On the North and South sides of this tube there project four horizontal rods, through the ends of which there pass vertical rods, which can be fixed by screws at any elevation; these are placed in connexion with the electrometers, which rest on the window seat.

The electrometers during the year 1876 consisted of two Volta's Electrometers, denoted by Nos. 1 and 2; a Henley's Electrometer; a Ronald's Spark Measurer; a Dry-pile Apparatus; and a Galvanometer.

Volta 1 and Volta 2 are of the same construction; each is furnished with a pair of straws 2 Paris inches in length; those of the latter being much heavier than those of the former: each instrument is furnished with a graduated ivory scale, whose radius is 2 Paris inches, and it is graduated into half Paris lines. In the original construction of these instruments it was intended that each division of No. 2 should correspond to five of No. 1: the actual relation between them has not been determined by observations at the Royal Observatory. The straws are suspended by hooks of fine copper wire to the suspension-piece, and they are separated by an interval of half a line.

Henley's Electrometer is supported on the West end of the large horizontal tube by means of a vertical rod fixed in it. On each side of the upper part of this rod is affixed a semicircular plate of ivory, whose circumference is graduated; at the centers of these ivory plates two pieces of brass are affixed, which are drilled to receive fine steel pivots, carrying a brass axis, into which the index or pendulum is inserted; the pendulum terminates with a pith ball. The relation between the graduations of this instrument and those of the other electrometers has not been determined. This instrument has seldom been affected till Volta 2 has risen to above 100 divisions of its scale.

The spark measurer consists of a vertical sliding rod terminated by a brass ball, which ball can be brought into contact with one of the vertical rods before referred to, also terminating in a ball; and it can be moved from it or towards it by means of a lever, with a wooden handle. During the operation of separating the balls, an index runs along a graduated scale, and exhibits the distance between the balls, and this distance measures the length of the spark.

The electrometers and the spark measurer were originally constructed under the superintendence of the late Sir Francis Ronalds, but have since received small alterations.

The dry-pile apparatus was made by Watkins and Hill; it is placed in connexion with the brass bar by a system of wires and brass rods. The indicator, which vibrates between the two poles, is a small piece of gold leaf. This instrument is very delicate, and it indicates at once the quality of the electricity. When the inclination of the gold leaf is such that it is directed towards the top of either pile, it remains there as long as the quantity of electricity continues the same or becomes greater: the position is sometimes expressed in the notes by the words "as far as possible." The angle which the gold leaf makes with the vertical at this time is about 40°. The action of the dry-pile apparatus was not satisfactory during the year 1876, and its indication of the quality of the electricity was uncertain. In consequence, reference for quality was when possible made to the galvanometer described in the next paragraph.

The galvanometer was made by Gourjon of Paris, and consists of an astatic needle, composed of two large sewing needles, suspended by a split silk fibre, one of the needles of the pair vibrating within a ring formed by 2,400 coils of fine copper wire. The connexions of the two portions of wire forming these 2,400 coils are so arranged that it is possible to use a single system of 1,200 coils of single wire, or a system of 1,200 coils of double wire, or a system of 2,400 coils of single wire: in practice the last has always been used. A small ball communicating by a wire with one end of the coils is placed in contact at pleasure with the electric conductor, and a wire leading from the other end of the coil communicates with the earth. An adjustible circular card, graduated to degrees, is placed immediately below the upper needle; the numeration of its divisions proceeds in both directions from a zero. One of these

directions is distinguished by the letter A, and the other by the letter B; and the nature of the indication represented by the deflection of the needle towards A or towards B will be ascertained from the following experiment. A voltaic battery being formed by means of a silver coin and a copper coin, having a piece of blotting paper moistened with saliva between them: when the copper touches the small ball, and the wire which usually communicates with the earth is made to touch the silver, the needle turns towards A; when the silver touches the small ball, and the wire is made to touch the copper, the needle turns towards B.

§ 24. *Instrument for the Registration of Sunshine.*

The instrument with which the record of duration of sunshine is obtained is one contrived by J. F. Campbell, Esq., and kindly placed by him at the service of the Royal Observatory. It consists of a very accurately formed sphere of glass, nearly 4 inches in diameter, supported concentrically within a well turned hemispherical metal bowl in such a manner that the image of the sun, formed when the sun shines, falls always on the concave surface of the bowl. A strip of some suitable material being fixed in the bowl, the sun, when shining, burns away the material at the points at which the image successively falls, by which means the record of periods of sunshine is obtained. The strip is removed after sunset, and a new one fixed ready for the following day. After some preliminary experiments, the instrument was brought into use on May 7. Until October 26, a strip of black waterproofed material, fixed by cement, was employed for the record. But there were some inconveniences in the use of this material, and from November 1 to the end of the year, plain white cardboard was employed. From October 27 to 31 the instrument was not in action. It was, however, found that the white cardboard did not give so complete a record, and ultimately (in the year 1877) blackened millboard was used. The place of the meridian is marked on the strip before removing it from the bowl. A series of time scales, suitable for different periods of the year, having been prepared, the proper scale is selected and placed against the record, which is then easily transferred to a sheet of paper specially ruled with equal vertical spaces to represent hours, each sheet containing the record for one calendar month. The instrument gives fairly the duration of sunshine, but (usually) no register is obtained at altitudes of less than 5°. Indeed, on fine days the register, which usually has a certain breadth, tapers off in the early morning and late evening hours to a fine point, thus showing the extent to which registration under the best circumstances is effective. The recorded durations are to be understood as indicating the amount of *bright* sunshine, no register being obtained when the sun shines faintly through fog or cloud.

My old plan giving a bowl made of hard wood tells time & needs no supervision. It gives a "mean" for six months. Casts in Gutta Percha made from bowls were sent to the Astronomer Royal March 31/79

6th April 1879. Several better devices have been contrived by me and will be sent to Mr Ellis presently when I get sunshine to test by J F Campbell.

§ 25. *Ozonometer.*

In the spring of the present year, an Ozonometer (furnished by Messrs. Horne and Thornthwaite) was fixed on the south-west corner of the roof of the Photographic Thermometer shed, at a height of about 10 feet from the ground. The box in which the papers are exposed is of wood: it is about 8 inches square, and blackened inside, and so constructed that there is free circulation of air through the box, without exposure of the paper to light. The papers are exposed and collected at 21^h, 3^h, and 9^h, and the degree of tint produced is compared with a scale of graduated tints, numbered from 0 to 10. The value of ozone for the civil day is determined by taking the degree of tint obtained at each hour of collection as proportional to the period of exposure. Thus to form the values for any given civil day, three-fourths of the value registered at 21^h, the values registered at 3^h and 9^h, and one-fourth of that registered at the following 21^h, are added together, the resulting sum being taken as the value referring to the civil day. The mean of the 21^h, 3^h, and 9^h values, as observed, are also given for each month. The observations were commenced 1876, April 1.

§ 26. *Explanation of the Tables of Meteorological Observations.*

The mean daily value of the difference between dew-point temperature and air-temperature is the difference between the two numbers in the sixth and seventh columns. The Greatest and Least are the greatest and least among the differences corresponding to the times of observation in the civil day, or they are found from the absolute maxima and minima, as determined by comparing the observations of the self-registering wet-bulb thermometers with those of the self-registering dry-bulb thermometers.

The difference between the mean temperature for the day and the mean for the same day of the year on an average of sixty years, is found by comparison with a table of results deduced by Mr. Glaisher from sixty years' observations, made at the Royal Observatory, ending 1873.

Little explanation of the results deduced from Osler's Anemometer appears to be necessary. It may be understood generally that the greatest pressure occurred in gusts of short duration.

To 1867, October 31, the indication of Robinson's Anemometer was read off every day at 22^h (10^h A.M.), and the difference between consecutive readings was entered opposite to the civil day on which the first reading was taken. From 1867, November 1, the daily values have been extracted from the sheets of the continuous record, applying to the interval from midnight to midnight, and are entered opposite to the civil day to which each value belongs.

The daily register of rain is given for each civil day ending at midnight: it is the amount collected in the Cylinder Rain-gauge partly sunk in the ground, described above as the "seventh." The "Number of Rainy Days" given in the abstract tables on pages (liii) and (lxv) is formed from the records of this gauge.

For understanding the divisions of time under the heads of Electricity and Weather, the following remarks are necessary:—The day is divided by columns into two parts (from midnight to noon, and from noon to midnight), and each of these parts is roughly subdivided into two or three parts by colons (:). Thus, when there is a single colon in the first column, it denotes that the remarks before it apply (roughly) to the interval from midnight to 6 A.M., and those following it to the interval from 6 A.M. to noon. When there are two colons in the first column, it is to be understood that the twelve hours are divided into three nearly equal parts of four hours each. And similarly for the second column.

The following is the explanation of the notation employed for record of electrical observations, it being premised that the quality of the Electricity is always to be supposed positive when no indication of quality is given:—

g-cur. denotes	*galvanic currents*	s denotes	*strong*
m ...	*moderate*	sp ...	*sparks*
N ...	*negative*	v ...	*variable*
P ...	*positive*	w ...	*weak*

The duplication of the letter denotes an intensity of the modification described, thus, s s is very strong; v v, very variable.

The Clouds and Weather are described generally by Howard's Nomenclature; the figure denotes the proportion of sky covered by clouds, the whole sky being represented by 10. The notation is as follows:

a denotes	*aurora borealis*	h-g denotes	*heavy gale*
ci ...	*cirrus*	glm ...	*gloom*
ci-cu ...	*cirro-cumulus*	gt-glm ...	*great gloom*
ci-s ...	*cirro-stratus*	h-fr ...	*hoar frost*
cu ...	*cumulus*	h ...	*haze*
cu-s ...	*cumulo-stratus*	hl ...	*hail*
d ...	*dew*	so-ha ...	*solar halo*
h-d ...	*heavy dew*	l ...	*lightning*
f ...	*fog*	li-cl ...	*light clouds*
sl-f ...	*slight fog*	lu-co ...	*lunar corona*
th-f ...	*thick fog*	lu-ha ...	*lunar halo*
fr ...	*frost*	m ...	*meteor*
g ...	*gale*	ms ...	*meteors*

mt	denotes	*mist*	oc-h-shs	denotes	*occasional heavy showers*
sl-mt	...	*slight mist*	sq	...	*squall*
n	...	*nimbus*	sqs	...	*squalls*
r	...	*rain*	fr-sqs	...	*frequent squalls*
th-r	...	*thin rain*	h-sqs	...	*heavy squalls*
oc-r	...	*occasional rain*	fr-h-sqs	...	*frequent heavy squalls*
oc-th-r	...	*occasional thin rain*	oc-sqs	...	*occasional squalls*
fr-r	...	*frozen rain*	sc	...	*scud*
h-r	...	*heavy rain*	li-sc	...	*light scud*
shs-r	...	*showers of rain*	sl	...	*sleet*
c-r	...	*continued rain*	sn	...	*snow*
c-h-r	...	*continued heavy rain*	oc-sn	...	*occasional snow*
m-r	...	*misty rain*	sl-sn	...	*slight snow*
fr-m-r	...	*frequent misty rain*	s	...	*stratus*
oc-m-r	...	*occasional misty rain*	t	...	*thunder*
sl-r	...	*slight rain*	t-s	...	*thunder storm*
h-shs	...	*heavy showers*	th-cl	...	*thin clouds*
fr-shs	...	*frequent showers*	v	...	*variable*
fr-h-shs	...	*frequent heavy showers*	vv	...	*very variable*
li-shs	...	*light showers*	w	...	*wind*
oc-shs	...	*occasional showers*	st-w	...	*strong wind*

The foot-notes show the means and extremes of readings, and their departure in each month from average values, as found from the preceding Thirty-five Years Observations; those relating to Humidity have been calculated from Glaisher's Hygrometrical Tables.

The tables of Meteorological Abstracts, following the Tables of Daily Results of Meteorological Observations, require no special explanation.

§ 27. *Observations of Luminous Meteors.*

In arranging for the observations of meteors, the directions circulated by the Committee of the British Association have received the most careful attention. The observers have been educated in the knowledge of the principal stars by observations of the stars themselves, and by means of globes and maps. The general instruction to all observers has been, to look out for meteors on every clear night; but the observer specially appointed for the evening's duties has been more particularly charged with this observation.

On the nights specially mentioned in the directions of the British Association Committee, greater attention was given to the sky, and the observations of meteors were

made more systematically. These nights are, January 2 and 15 to 19; February 10 and 19; March 1 to 4 and 18; April 20 and 25 to 30; May 18; June 6 and 20; July 17, 20, and 29; August 3 and 7 to 13 (especially August 10); September 10; October 1 to 6 and 16 to 23; November 12 to 14, 19, 28, and 30; December 6 to 14 (especially December 11) and December 24.

Special arrangements were made in the August period for observing till the morning; and in the November period for observing through the night, one or two observers being on duty till midnight, and others till daybreak. The observers were so stationed as to command different views of the sky, to secure observation of all the meteors which might present themselves, and to guard against the observation of the same meteor by different observers.

The observers in the year 1876 were Mr. Ellis, Mr. Nash, Mr. Cross, Mr. Todd, Mr. Greengrass, Mr. Power, and Mr. James. Their observations are distinguished by the initials E., N., C., T., G., P., and J., respectively. Other observations, with the initials L. and M., were made by Mr. Lynn and Mr. Maunder respectively.

§ 28. *Details of the Chemical Operations for the Photographic Records.*

The papers used in 1876 were principally those furnished by Towgood and Whatman.

First Operation.—Preliminary Preparation of the Paper.

The chemical solutions used in this process are the following :—

(1.) Sixteen grains of Iodide of Potassium are dissolved in one ounce of distilled water.

(2.) Twenty-four grains of Bromide of Potassium are dissolved in one ounce of distilled water.

(3.) When the crystals are dissolved, the two solutions are mixed together, forming the iodising solution. The mixture will keep through any length of time. Immediately before use, it is filtered through filtering paper.

A quantity of the paper, sufficient for the consumption of several weeks, is treated in the following manner, sheet after sheet.

> The sheet of paper is pinned by its four corners to a horizontal board. Upon the paper, a sufficient quantity (about 50 minims, or $\frac{5}{48}$ of an ounce troy) of the iodising solution is applied, by pouring it upon the paper in front of a glass rod, which is then moved to and fro till the whole surface is uniformly wetted by the solution. Or, the solution may be evenly distributed by means of a camel-hair brush.

The paper thus prepared is allowed to remain in a horizontal position for a few minutes, and is then hung up to dry in the air; when dry, it is placed in a drawer, and may be kept through any length of time.

Second Operation.—Rendering the Paper sensitive to the Action of Light.

A solution of Nitrate of Silver is prepared by dissolving 50 grains of crystallized Nitrate of Silver in one ounce of distilled water. Since the magnetic basement has been used for photography, 15 grains of Acetic Acid have always been added to the solution.

Then the following operation is performed in a room illuminated by yellow light.

The paper is pinned as before upon a board somewhat smaller than itself, and (by means of a glass rod, as before,) its surface is wetted with 50 minims of the Nitrate of Silver solution. It is allowed to remain a short time in a horizontal position, and, if any part of the paper still shines from the presence of a part of the solution unabsorbed into its texture, the surperfluous fluid is taken off by the application of blotting paper.

The paper, still damp, is immediately placed upon the cylinder, and is covered by the exterior glass tube, and the cylinder is mounted upon the revolving apparatus, to receive the spot of light formed by the mirror, which is carried by the magnet; or to receive the line of light passing through the thermometer tube.

Third Operation.—Development of the Photographic Trace.

When the paper is removed from the cylinder, it is placed as before upon a board, and a saturated solution of Gallic Acid, to which a few drops of Aceto-Nitrate of Silver are occasionally added, is spread over the paper by means of a glass rod, and this action is continued until the trace is fully developed. The solutions are kept in the magnetic basement, and are always used at the temperature of that room. When the trace is well developed, the paper is placed in a vessel with water, and repeatedly washed with several changes of water; a brush being passed lightly over both sides of the paper to remove any crystalline deposit.

Fourth Operation.—Fixing the Photographic Trace.

The Photograph is placed in a solution of Hyposulphite of Soda, made by dissolving four or five ounces of the Hyposulphite in a pint of water; it is plunged completely in the liquid, and allowed to remain from one to two hours, until the yellow tint of the Iodide of Silver is removed. After this the sheet is washed

repeatedly with water, allowed to remain immersed in water for 24 hours, and afterwards placed within folds of cotton cloths till nearly dry. Finally it is placed between sheets of blotting-paper, and is pressed.

§ 29. *Personal Establishment.*

The personal establishment during the year 1876 has consisted of William Ellis, Esq., Superintendent of the Magnetical and Meteorological Department, and William Carpenter Nash, Esq., Assistant.

Three or four computers have usually been attached to the Department.

Royal Observatory, Greenwich, G. B. AIRY.
1878, June 15.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

MAGNETICAL OBSERVATIONS.

1876.

ROYAL OBSERVATORY, GREENWICH.

REDUCTION

OF THE

MAGNETIC OBSERVATIONS

(EXCLUDING A DAY OF MAGNETIC DISTURBANCE).

1876.

Table I.—Mean Western Declination of the Magnet on each Astronomical Day, as deduced from the Mean of Twenty-four Hourly Measures of Ordinates of the Photographic Register on that Day.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	1876.											
	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	18°
d	′	′	′	′	′	′	′	′	′	′	′	′
1	17·0	14·7	13·0	11·7	..	10·3	7·9	8·5	5·5	3·9	2·1	60·6
2	17·2	14·5	13·6	12·4	..	10·0	8·6	7·7	4·8	4·6	0·8	60·6
3	17·0	13·8	13·1	12·1	..	10·2	7·8	8·2	4·5	4·1	2·2	60·5
4	17·1	15·3	12·4	11·7	..	9·7	9·5	7·7	3·9	2·7	1·8	60·7
5	18·1	14·1	12·8	11·7	..	10·2	9·4	7·5	5·3	2·9	1·8	60·4
6	17·4	14·7	12·8	11·6	..	10·2	9·3	7·0	5·4	0·1	1·8	60·5
7	16·8	14·4	13·3	12·1	..	10·9	8·7	6·7	5·5	2·7	1·9	60·6
8	17·0	14·2	13·5	11·8	..	10·0	9·5	6·9	4·9	2·4	2·2	60·9
9	17·6	14·4	12·8	12·2	..	10·7	9·8	7·3	6·1	2·9	2·8	61·9
10	17·6	13·7	13·8	11·9	..	9·7	9·6	6·7	5·5	3·9	1·6	62·1
11	17·1	14·2	11·6	12·2	..	9·7	10·0	6·8	5·8	2·6	2·3	61·7
12	17·7	14·4	13·2	10·0	..	9·9	9·9	6·9	4·7	2·4	3·1	61·4
13	15·8	13·8	13·2	12·1	10·5	10·3	9·0	7·3	3·5	2·2	1·5	61·4
14	15·3	13·8	13·1	11·8	10·4	9·7	8·2	6·7	4·7	2·1	1·4	61·3
15	17·3	14·1	13·5	11·6	10·3	10·3	7·8	6·8	4·8	3·2	..	61·2
16	16·6	13·7	12·4	10·8	9·7	9·7	7·7	7·2	4·2	2·8	1·2	60·7
17	17·0	12·1	11·8	11·6	11·2	10·6	8·4	5·8	4·0	2·7	1·7	61·6
18	17·3	13·1	12·5	12·3	11·2	10·5	8·6	4·0	3·9	3·0	2·2	61·3
19	17·2	..	13·2	10·5	10·3	9·6	8·0	5·9	5·0	2·9	0·6	60·9
20	16·7	13·0	12·7	12·6	11·2	8·9	8·5	5·0	5·3	1·7	1·0	60·9
21	16·6	11·9	12·2	11·7	11·9	9·7	8·3	5·6	4·7	2·2	1·0	60·5
22	16·4	12·6	12·4	12·3	11·3	8·7	8·0	5·3	1·1	1·7	1·3	59·9
23	15·8	12·7	12·3	11·6	10·1	8·1	..	7·1	4·3	0·6	1·1	60·2
24	16·6	13·0	11·9	12·6	11·0	8·3	..	6·4	3·8	1·0	0·7	60·3
25	16·8	13·1	11·6	11·1	11·2	8·9	..	7·1	3·3	1·5	0·9	60·3
26	16·2	12·7	11·4	11·5	10·8	8·5	..	5·5	3·6	2·2	1·0	60·6
27	16·4	12·8	12·3	11·3	10·1	9·8	..	6·6	3·6	1·8	0·9	56·9
28	16·4	12·7	12·9	11·1	..	10·1	8·5	5·8	3·1	2·1	1·2	59·8
29	16·8	12·8	12·8	10·3	..	9·6	8·2	6·7	3·3	2·1	1·3	60·8
30	15·9		13·0	9·9	..	9·1	8·5	6·1	3·6	1·9	1·1	60·9
31	16·9		13·6		11·1		8·3	5·7		2·2		60·9

Table II.—Mean Monthly Determination of the Western Declination of the Magnet at every Hour of the Day; obtained by taking the Mean of all the Determinations at the same Hour of the Day through the Month.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	1876.											
	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	18°	18°
h	′	′	′	′	′	′	′	′	′	′	′	′
0	18·9	16·4	16·7	15·6	15·3	14·0	13·2	12·2	9·3	6·1	64·8	62·7
1	19·7	16·6	17·9	17·1	15·5	15·0	14·3	12·9	9·8	7·0	64·9	63·2
2	19·1	16·5	17·5	16·9	15·2	15·0	14·4	12·1	8·7	6·9	64·1	62·6
3	18·4	15·3	16·2	15·6	14·1	14·1	13·3	10·4	7·2	5·7	63·2	61·8
4	18·2	14·3	14·7	14·2	13·1	12·7	12·0	8·7	5·7	4·2	62·5	61·3
5	17·7	14·0	13·6	13·0	12·1	11·4	10·6	7·4	5·0	3·1	61·9	60·6
6	17·1	13·4	12·9	12·0	11·5	10·5	9·5	6·6	4·7	2·4	61·4	60·3
7	16·6	13·3	12·0	11·2	10·8	10·0	8·8	6·3	4·5	1·3	61·1	60·3
8	15·5	13·0	11·5	11·0	9·0	9·9	8·5	6·0	3·9	0·6	60·5	59·8
9	15·0	12·3	11·2	11·0	10·2	9·8	8·3	5·5	3·2	0·4	60·0	58·9
10	14·7	11·7	11·0	10·7	10·3	9·4	8·1	5·0	2·7	0·7	59·6	59·0
11	15·2	11·9	10·9	10·5	10·1	8·9	8·1	4·9	2·5	1·1	59·5	59·3
12	15·8	12·2	11·0	10·6	10·2	8·7	8·1	4·9	2·8	1·2	59·8	59·6
13	16·1	12·4	11·4	10·5	10·0	8·5	7·6	5·3	2·8	1·3	60·5	60·2
14	16·3	13·0	11·6	10·5	9·5	8·5	7·1	5·2	2·8	1·5	61·1	60·6
15	16·6	13·2	11·5	10·4	9·1	8·4	7·0	4·9	2·8	1·7	61·3	60·8
16	16·9	13·0	11·4	10·1	8·2	7·6	6·4	4·8	2·8	1·7	61·3	60·8
17	16·8	13·0	11·6	10·0	7·3	6·5	5·1	4·3	2·8	1·5	61·1	60·8
18	16·7	12·8	11·8	9·5	6·9	5·7	4·3	3·5	2·5	1·3	60·9	60·7
19	16·3	13·0	11·3	8·7	7·0	5·3	4·2	2·8	2·1	0·9	60·8	60·6
20	15·9	13·0	10·4	7·9	7·6	5·6	4·9	3·1	1·9	0·5	60·7	60·3
21	15·9	13·0	10·6	8·2	9·0	6·9	6·1	4·4	2·8	0·8	60·5	60·3
22	16·9	13·7	12·3	10·3	11·7	9·1	8·1	7·0	4·8	1·9	61·8	61·1
23	17·7	14·9	14·7	13·0	14·2	11·8	10·7	10·1	7·3	4·2	63·6	61·8

TABLE III.

1876.

Month.	MEAN WESTERN DECLINATION of the MAGNET IN EACH MONTH.	EXCESS OF WESTERN DECLINATION above 18°, converted into WESTERLY FORCE, and expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM.	MONTHLY MEANS of all the Actual DIURNAL RANGES of the WESTERN DECLINATION, as deduced from the Twenty-four Hourly Measures of each day.
	° ′		′
January	19. 16·8	0·0401	6·5
February	19. 13·6	·0385	6·9
March	19. 12·7	·0380	10·0
April	19. 11·6	·0374	9·8
May	19. 10·8	·0370	10·0
June	19. 9·7	·0365	10·8
July	19. 8·7	·0360	11·1
August	19. 6·6	·0348	11·0
September	19. 4·4	·0337	9·2
October	19. 2·4	·0326	8·4
November	19. 1·5	·0322	6·8
December	19. 0·7	·0318	5·7
Mean	19. 8·3	0·0357	8·8

TABLE IV.—MEAN HORIZONTAL MAGNETIC FORCE, expressed in terms of the Mean Horizontal Force for the Year, and diminished by a Constant (0·8600 nearly), uncorrected for TEMPERATURE, on each ASTRONOMICAL DAY; as deduced from the MEAN of TWENTY-FOUR HOURLY MEASURES of ORDINATES of the PHOTOGRAPHIC REGISTER on that DAY.

1876.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	0·1515	0·1519	0·1520	0·1511	..	0·1512	0·1506	0·1507	0·1509	0·1505	0·1502	0·1512
2	·1516	·1520	·1520	·1511	..	·1511	·1505	·1510	·1512	·1508	·1503	·1517
3	·1522	·1519	·1524	·1511	..	·1512	·1505	·1507	·1510	·1510	·1506	·1517
4	·1518	·1517	·1513	·1509	..	·1511	·1510	·1510	·1517	·1508	·1507	·1517
5	·1513	·1505	·1518	·1510	..	·1514	·1511	·1507	·1512	·1510	·1510	·1521
6	·1515	·1509	·1522	·1514	..	·1509	·1507	·1506	·1510	·1506	·1507	·1519
7	·1515	·1509	·1514	·1512	..	·1509	·1506	·1505	·1511	·1506	·1508	·1519
8	·1511	·1509	·1517	·1514	..	·1513	·1507	·1505	·1511	·1509	·1507	·1515
9	·1513	·1512	·1514	·1514	..	·1513	·1503	·1506	·1512	·1506	·1508	·1516
10	·1512	·1508	·1517	·1516	..	·1514	·1499	·1500	·1512	·1505	·1502	·1496
11	·1511	·1508	·1513	·1515	..	·1510	·1502	·1505	·1509	·1498	·1506	·1505
12	·1510	·1507	·1516	·1516	..	·1513	·1506	·1505	·1513	·1503	·1506	·1507
13	·1512	·1505	·1512	·1514	0·1513	·1515	·1507	·1500	·1512	·1506	·1504	·1510
14	·1502	·1514	·1518	·1515	·1513	·1513	·1510	·1500	·1512	·1510	·1510	·1508
15	·1505	·1517	·1517	·1520	·1511	·1515	·1507	·1500	·1513	·1508	..	·1510
16	·1505	·1520	·1512	·1516	·1515	·1515	·1504	·1501	·1517	·1508	·1505	·1512
17	·1513	·1525	·1511	·1511	·1516	·1517	·1501	·1502	·1516	·1508	·1505	·1508
18	·1517	·1524	·1509	·1519	·1515	·1512	·1499	·1508	·1517	·1509	·1507	·1506
19	·1512	..	·1510	·1511	·1515	·1518	·1503	·1508	·1515	·1508	·1507	·1510
20	·1516	·1510	·1509	·1515	·1516	·1520	·1506	·1515	·1514	·1506	·1509	·1510
21	·1516	·1516	·1513	·1518	·1514	·1511	·1505	·1516	·1515	·1504	·1509	·1509
22	·1511	·1519	·1515	·1519	·1513	·1513	·1498	·1508	·1513	·1505	·1509	·1506
23	·1505	·1515	·1517	·1516	·1514	·1518	·1502	·1509	·1512	·1501	·1511	·1507
24	·1510	·1515	·1519	·1515	·1518	·1513	·1504	·1504	·1510	·1501	·1513	·1508
25	·1510	·1513	·1498	·1514	·1511	·1512	·1501	·1504	·1511	·1503	·1515	·1506
26	·1511	·1512	·1508	·1513	·1512	·1512	·1507	·1508	·1511	·1504	·1509	·1509
27	·1519	·1516	·1518	·1518	·1517	·1511	·1497	·1505	·1511	·1502	·1510	·1515
28	·1519	·1520	·1517	·1514	..	·1502	·1507	·1512	·1510	·1505	·1509	·1516
29	·1518	·1521	·1517	·1514	..	·1508	·1503	·1504	·1508	·1504	·1508	·1514
30	·1520		·1515	·1513	..	·1508	·1505	·1502	·1509	·1505	·1515	·1517
31	·1517		·1514		·1512		·1507	·1505		·1500		·1517

TABLE V.—DAILY MEANS of READINGS (usually eight on each Day) of the THERMOMETER placed on the box inclosing the HORIZONTAL FORCE MAGNETOMETER, for each ASTRONOMICAL DAY.

1876.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	62·7	62·0	62·3	62·7	62·6	64·4	67·6	65·5	65·2	64·6	61·8	63·7
2	62·4	62·0	62·4	61·8	62·5	64·6	68·8	66·1	65·5	65·2	62·5	63·9
3	62·4	61·8	62·7	62·3	63·0	64·7	69·1	66·9	65·7	67·1	63·7	62·9
4	61·7	61·9	62·3	63·9	63·0	63·9	68·7	66·7	67·4	67·7	64·3	62·8
5	61·1	62·3	62·8	64·5	62·8	64·9	68·5	67·1	68·2	68·1	63·2	62·7
6	60·4	61·9	62·4	63·8	63·3	65·1	68·9	67·8	67·4	68·9	62·8	63·0
7	59·6	62·0	62·1	62·8	63·1	64·6	69·2	69·0	65·8	69·2	62·6	63·4
8	59·9	62·0	62·1	63·4	63·0	64·5	69·0	69·7	65·2	68·8	62·3	62·9
9	61·1	62·1	61·4	62·5	63·0	63·8	67·5	70·1	64·3	68·2	61·6	62·7
10	61·9	62·1	61·9	61·7	63·0	63·4	66·7	69·4	63·5	67·9	59·7	62·9
11	61·9	61·8	62·8	61·1	63·3	64·5	65·8	68·9	64·2	67·2	60·1	63·0
12	62·3	62·2	61·1	60·8	62·6	65·5	66·4	69·4	63·9	67·4	62·2	62·6
13	62·1	62·6	60·6	61·6	62·6	64·9	67·9	70·8	63·7	67·0	63·0	62·4
14	61·6	61·7	60·8	62·0	62·6	64·8	69·4	71·8	64·3	65·9	64·5	62·7
15	62·0	61·7	62·2	62·1	62·9	64·6	70·1	73·0	64·0	65·2	65·6	62·6
16	62·7	61·9	61·8	62·6	62·7	63·9	71·2	73·5	64·1	66·2	65·5	62·7
17	62·4	62·1	61·6	62·9	62·6	63·8	71·2	72·0	64·6	67·3	64·3	62·6
18	62·1	61·9	61·6	63·1	62·6	65·1	70·9	71·5	65·2	67·6	64·8	62·6
19	62·5	62·1	62·5	63·1	62·5	65·9	70·7	71·5	65·3	67·1	63·1	62·3
20	62·5	62·3	62·3	62·5	62·9	66·9	70·5	67·9	65·3	65·9	62·7	62·3
21	62·5	62·3	63·2	62·7	63·6	67·9	69·9	68·9	65·9	65·2	62·3	62·3
22	61·9	62·1	62·8	63·1	63·3	67·1	70·3	67·6	66·9	63·6	61·6	62·5
23	61·7	61·7	62·6	62·9	62·6	66·1	67·7	66·2	67·5	64·0	61·5	61·2
24	62·2	61·9	63·1	63·1	62·6	66·4	67·7	65·1	67·0	64·0	62·2	61·8
25	62·5	62·7	63·2	63·0	62·8	66·2	69·0	64·3	66·6	64·1	62·5	61·1
26	63·3	62·6	62·1	63·1	63·4	66·6	69·6	65·0	66·7	64·9	62·6	61·0
27	62·6	62·4	62·6	63·2	63·6	67·3	68·9	65·5	65·8	64·8	62·7	62·3
28	61·6	62·9	62·6	63·0	63·6	67·9	67·8	66·7	66·2	64·4	62·3	63·2
29	61·8	63·0	62·5	63·0	64·2	66·1	67·7	67·2	65·0	63·5	62·4	63·1
30	62·4		62·3	62·3	64·7	66·1	67·3	66·2	65·3	63·7	62·7	62·7
31	62·4		62·5		64·6		66·1	64·3		62·7		62·2

TABLE VI.—MEAN MONTHLY DETERMINATION of the HORIZONTAL MAGNETIC FORCE, expressed in terms of the Mean Horizontal Force for the Year, and diminished by a Constant (0·8600 nearly), uncorrected for TEMPERATURE, at every HOUR of the DAY; obtained by taking the MEAN of all the DETERMINATIONS at the same HOUR of the DAY through each MONTH.

1876.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h												
0	0·1510	0·1510	0·1511	0·1507	0·1511	0·1507	0·1497	0·1501	0·1508	0·1499	0·1503	0·1510
1	·1513	·1512	·1514	·1510	·1515	·1509	·1501	·1503	·1512	·1503	·1506	·1511
2	·1514	·1514	·1515	·1513	·1516	·1512	·1505	·1505	·1513	·1505	·1508	·1511
3	·1514	·1514	·1516	·1514	·1518	·1515	·1507	·1506	·1514	·1505	·1508	·1511
4	·1514	·1515	·1517	·1515	·1520	·1515	·1508	·1508	·1514	·1505	·1509	·1512
5	·1513	·1514	·1516	·1518	·1521	·1517	·1509	·1509	·1514	·1507	·1509	·1512
6	·1513	·1514	·1517	·1520	·1521	·1518	·1511	·1509	·1516	·1507	·1510	·1512
7	·1512	·1516	·1517	·1520	·1521	·1519	·1512	·1512	·1517	·1508	·1510	·1512
8	·1512	·1515	·1515	·1518	·1520	·1519	·1510	·1512	·1517	·1507	·1509	·1511
9	·1512	·1516	·1516	·1517	·1518	·1518	·1508	·1511	·1517	·1508	·1509	·1511
10	·1513	·1515	·1516	·1517	·1517	·1517	·1508	·1510	·1516	·1508	·1509	·1510
11	·1513	·1514	·1516	·1517	·1516	·1517	·1507	·1510	·1515	·1508	·1509	·1510
12	·1512	·1514	·1516	·1517	·1515	·1515	·1507	·1509	·1514	·1508	·1508	·1510
13	·1512	·1514	·1515	·1517	·1515	·1514	·1507	·1509	·1514	·1507	·1507	·1510
14	·1513	·1513	·1515	·1516	·1515	·1514	·1506	·1509	·1513	·1507	·1508	·1511
15	·1513	·1514	·1515	·1516	·1514	·1514	·1506	·1508	·1513	·1507	·1509	·1511
16	·1514	·1516	·1517	·1515	·1514	·1514	·1506	·1508	·1513	·1508	·1510	·1512
17	·1516	·1516	·1517	·1516	·1512	·1513	·1506	·1507	·1513	·1508	·1512	·1513
18	·1516	·1518	·1517	·1516	·1510	·1511	·1505	·1506	·1512	·1509	·1512	·1514
19	·1517	·1517	·1517	·1516	·1508	·1509	·1502	·1504	·1511	·1508	·1511	·1514
20	·1515	·1516	·1514	·1513	·1506	·1505	·1498	·1500	·1507	·1505	·1509	·1513
21	·1513	·1514	·1510	·1508	·1504	·1503	·1494	·1495	·1504	·1501	·1505	·1511
22	·1511	·1513	·1507	·1503	·1505	·1502	·1493	·1494	·1502	·1498	·1502	·1511
23	·1510	·1512	·1507	·1503	·1507	·1504	·1494	·1497	·1503	·1498	·1501	·1510

The Thermometer on the box inclosing the Horizontal Force Magnetometer was read generally eight times every day. The Monthly means of the readings for the same nominal hour show no sensible Diurnal Inequality of Temperature.

TABLE VII.

1876.

Month.	Mean Horizontal Magnetic Force in each Month, uncorrected for Temperature. Expressed in terms of the Mean Horizontal Force for the Year, and diminished by a Constant (0·8600 nearly).	Expressed in terms of Gauss's Unit measured on the Metrical System, and diminished by a Constant (1·5454 nearly).	Mean Temperature.
			°
January	0·1513	0·2719	61·9
February	·1514	·2721	62·1
March	·1515	·2723	62·2
April	·1514	·2721	62·7
May	·1514	·2721	63·1
June	·1513	·2719	65·4
July	·1504	·2703	68·7
August	·1506	·2707	68·3
September	·1512	·2718	65·6
October	·1506	·2707	66·1
November	·1508	·2710	62·8
December	·1511	·2716	62·6

The value 0·8600 of Horizontal Force corresponds to 1·5454 of Gauss's Unit on the Metrical System.

TABLE VIII.—Mean Vertical Magnetic Force, expressed in terms of the Mean Vertical Force for the Year, and diminished by a Constant (0·9600 nearly), uncorrected for Temperature, on each Astronomical Day; as deduced from the Mean of Twenty-four Hourly Measures of Ordinates of the Photographic Register on that Day.

1876.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	0·0358	0·0351	0·0338	0·0347	0·0335	0·0341	..	0·0316	0·0305	0·0302	0·0270	0·0289
2	·0361	·0350	·0345	·0341	·0333	·0346	..	·0330	·0310	·0298	·0274	·0293
3	·0360	·0348	·0349	·0343	·0342	·0341	..	·0336	·0315	·0316	·0289	·0287
4	·0352	·0350	·0350	·0360	·0343	·0336	..	·0334	·0333	·0322	·0291	·0277
5	·0346	·0354	·0356	·0360	·0341	·0348	..	·0339	·0338	·0327	·0279	·0276
6	·0340	·0351	·0349	·0360	·0342	·0355	..	·0344	·0332	·0338	·0279	·0281
7	·0333	·0351	·0348	·0345	·0345	·0346	..	·0362	·0312	·0343	·0275	·0286
8	·0334	·0353	·0347	·0345	·0344	·0348	0·0367	·0365	·0307	·0343	·0271	·0281
9	·0344	·0354	·0339	·0344	·0339	·0347	·0359	·0367	·0296	·0327	·0260	·0274
10	·0355	·0353	·0347	·0331	·0340	·0336	·0339	·0355	·0290	·0323	..	·0285
11	·0356	·0354	·0357	·0327	·0343	·0348	·0328	·0345	·0290	·0314	·0254	·0279
12	·0358	·0362	·0342	·0323	·0336	·0368	·0339	·0358	·0290	·0315	·0276	·0274
13	·0351	·0358	·0347	·0331	·0339	·0356	·0361	·0375	·0287	·0314	·0283	·0273
14	·0351	·0348	·0349	·0339	·0342	·0341	·0377	·0383	·0293	·0292	·0297	·0276
15	·0354	·0346	·0347	·0339	·0345	·0346	·0383	·0393	·0291	·0292	·0304	·0278
16	·0357	·0349	·0347	·0346	·0342	·0336	·0387	·0381	·0294	·0304	·0305	·0274
17	·0353	·0354	·0343	·0346	·0339	·0339	·0384	·0377	·0299	·0317	·0296	·0273
18	·0350	·0347	·0346	·0345	·0341	·0351	·0374	·0368	·0305	·0320	·0304	·0273
19	·0361	..	·0355	·0346	·0340	..	·0374	·0365	·0302	·0316	·0288	·0270
20	·0360	·0352	·0347	·0340	·0345	..	·0371	·0333	·0303	·0308	·0278	·0269
21	·0356	·0348	·0354	·0345	·0353	..	·0367	·0338	·0310	·0293	·0277	·0265
22	·0348	·0348	·0346	·0347	·0350	..	·0375	·0325	·0318	·0290	·0268	·0261
23	·0346	·0343	·0340	·0346	·0339	..	·0350	·0306	·0325	·0293	·0264	·0261
24	·0353	·0345	·0349	·0348	·0338	..	·0336	·0297	·0325	·0297	·0276	·0263
25	·0352	·0356	·0355	·0346	·0340	..	·0357	·0292	·0316	·0297	·0279	·0262
26	·0368	·0350	·0344	·0346	·0345	..	·0364	·0312	·0317	·0306	·0281	·0251
27	·0359	·0348	·0347	·0348	·0345	..	·0350	·0317	·0309	·0305	·0282	·0261
28	·0351	·0349	·0347	·0342	·0347	..	·0339	·0326	·0310	·0297	·0277	·0275
29	·0347	·0352	·0344	·0344	·0347	..	·0334	·0330	·0295	·0290	·0277	·0279
30	·0356		·0346	·0337	·0350	..	·0336	·0321	·0304	·0291	·0281	·0272
31	·0358		·0351		·0340		·0321	·0298		·0278		·0270

TABLE IX.—DAILY MEANS of READINGS (usually eight on each Day) of the THERMOMETER placed on the box inclosing the VERTICAL FORCE MAGNETOMETER, for each ASTRONOMICAL DAY.

1876.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	62·7	62·0	61·7	62·7	62·7	63·9	68·0	65·2	65·2	64·4	61·8	63·8
2	62·8	62·2	62·0	61·8	62·3	64·3	69·4	65·5	65·7	64·8	62·5	64·3
3	62·2	62·0	62·5	62·2	63·1	63·6	69·5	66·9	66·1	66·8	63·9	62·8
4	61·8	62·1	62·1	63·9	62·9	62·8	68·8	66·5	67·6	67·5	64·5	62·6
5	61·2	62·5	62·7	63·7	62·6	64·2	68·3	67·4	68·3	67·9	63·2	62·6
6	60·8	61·8	62·2	63·5	63·0	64·6	68·9	67·8	67·4	68·9	62·9	63·0
7	59·6	62·2	62·4	62·8	62·9	64·1	69·4	69·5	65·5	69·2	63·1	63·5
8	60·2	62·1	61·7	62·8	63·0	64·1	69·2	70·1	65·1	68·4	62·6	62·7
9	61·5	62·4	61·4	62·2	62·7	63·6	67·2	70·5	64·3	67·7	61·7	62·3
10	62·3	62·4	62·1	61·1	62·8	63·0	66·3	69·4	63·4	67·2	59·7	63·2
11	61·8	62·2	62·9	61·0	63·2	64·3	65·3	69·2	63·7	66·6	60·2	62·9
12	62·5	63·1	61·6	60·7	62·5	66·1	66·6	70·0	63·7	67·0	63·2	62·5
13	61·9	62·6	60·8	61·5	63·0	64·9	68·7	71·7	63·3	66·7	62·9	62·8
14	61·6	61·8	61·4	62·2	62·8	64·4	70·6	72·8	64·0	65·2	64·2	62·9
15	61·9	62·0	62·2	61·9	63·2	64·6	70·7	73·7	63·6	64·6	65·2	62·9
16	62·8	62·7	62·0	63·0	63·1	63·6	71·5	73·1	63·8	66·3	64·8	62·7
17	61·9	62·7	62·0	62·7	62·7	63·8	71·4	72·6	64·3	67·1	63·9	62·6
18	61·6	61·9	62·1	62·9	62·9	65·1	71·1	71·6	65·1	67·3	64·7	62·3
19	62·9	62·4	62·9	62·7	62·5	66·5	70·9	71·6	64·7	67·1	62·8	62·2
20	62·5	62·3	62·2	62·2	63·4	67·8	70·8	68·1	64·7	65·5	62·4	62·2
21	62·2	61·9	63·1	62·7	64·0	68·5	70·3	69·0	65·5	64·9	62·2	62·1
22	61·7	62·0	62·1	63·1	63·5	67·5	70·8	67·2	66·8	63·7	61·4	61·3
23	62·1	61·5	62·1	62·8	62·6	65·9	67·2	65·7	67·3	64·0	61·5	61·5
24	61·9	61·8	62·8	62·9	62·7	66·2	67·5	64·6	66·6	64·0	62·4	62·0
25	62·2	62·7	62·8	63·1	62·9	66·5	69·4	64·0	66·4	63·9	62·3	61·2
26	63·3	62·1	62·1	62·9	63·3	67·3	69·8	65·3	66·4	64·9	62·6	61·2
27	62·6	61·7	62·6	62·9	63·5	68·2	68·7	65·5	65·5	64·6	62·5	61·7
28	61·8	62·5	62·2	62·4	63·5	68·4	67·4	66·7	65·8	64·3	62·2	62·8
29	62·0	62·7	62·3	63·0	63·9	66·2	67·1	66·9	64·3	63·2	62·3	63·3
30	62·7		62·3	62·3	64·6	66·0	67·4	66·2	64·8	63·5	62·8	62·8
31	62·5		62·6		64·3		65·8	64·0		62·6		62·5

TABLE X.—MEAN MONTHLY DETERMINATION of the VERTICAL MAGNETIC FORCE, expressed in terms of the Mean Vertical Force for the Year, and diminished by a Constant (0·9600 nearly), uncorrected for TEMPERATURE, at every HOUR of the DAY; obtained by taking the MEAN of all the DETERMINATIONS at the same HOUR of the DAY through each MONTH.

1876.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h												
0	0·0348	0·0347	0·0342	0·0335	0·0334	0·0336	0·0352	0·0336	0·0304	0·0306	0·0277	0·0271
1	·0350	·0348	·0343	·0337	·0336	·0339	·0357	·0341	·0305	·0308	·0279	·0272
2	·0352	·0349	·0343	·0339	·0339	·0342	·0360	·0344	·0307	·0310	·0280	·0273
3	·0352	·0350	·0345	·0340	·0340	·0345	·0364	·0347	·0309	·0312	·0280	·0274
4	·0352	·0350	·0346	·0342	·0343	·0348	·0367	·0350	·0310	·0313	·0281	·0274
5	·0354	·0350	·0346	·0343	·0344	·0350	·0369	·0351	·0311	·0313	·0282	·0275
6	·0355	·0352	·0347	·0344	·0346	·0351	·0371	·0352	·0311	·0313	·0282	·0276
7	·0356	·0354	·034[illegible]	·0345	·0347	·0352	·0372	·0352	·0311	·0313	·0283	·0277
8	·0356	·0355	·0351	·0348	·0348	·0352	·0372	·0352	·0311	·0312	·0283	·0277
9	·0356	·0355	·0351	·0350	·0350	·0352	·0373	·0352	·0310	·0311	·0282	·0276
10	·0355	·0355	·0352	·0351	·0350	·0353	·0370	·0350	·0310	·0310	·0282	·0276
11	·0355	·0355	·0352	·0352	·0350	·0353	·0366	·0347	·0310	·0310	·0282	·0276
12	·0355	·0355	·0352	·0351	·0350	·0352	·0362	·0344	·0310	·0310	·0282	·0276
13	·0355	·0354	·0352	·0350	·0348	·0351	·0358	·0342	·0309	·0310	·0282	·0275
14	·0354	·0353	·0351	·0348	·0346	·0349	·0355	·0339	·0309	·0309	·0282	·0274
15	·0353	·0352	·0350	·0346	·0344	·0348	·0351	·0337	·0308	·0308	·0281	·0274
16	·0352	·0351	·0349	·0345	·0343	·0347	·0348	·0335	·0307	·0307	·0280	·0273
17	·0351	·0350	·0347	·0344	·0341	·0345	·0345	·0334	·0306	·0307	·0280	·0273
18	·0351	·0349	·0347	·0342	·0340	·0344	·0345	·0332	·0305	·0306	·0279	·0272
19	·0351	·0349	·0347	·0341	·0338	·0342	·0342	·0331	·0304	·0306	·0279	·0272
20	·0351	·0349	·0347	·0340	·0337	·0341	·0342	·0331	·0303	·0305	·0279	·0272
21	·0350	·0348	·0345	·0339	·0336	·0339	·0344	·0332	·0303	·0305	·0279	·0271
22	·0349	·0347	·0343	·0337	·0334	·0337	·0345	·0332	·0302	·0304	·0278	·0270
23	·0348	·0346	·0342	·0335	·0332	·0337	·0346	·0334	·0302	·0303	·0277	·0270

The Thermometer on the box inclosing the Vertical Force Magnetometer was read generally eight times every day. The Monthly means of the readings for the same nominal hour show no sensible Diurnal Inequality of Temperature.

TABLE XI.

1876.

Month.	Mean Vertical Magnetic Force in each Month, uncorrected for Temperature. Expressed in terms of the Mean Vertical Force for the Year, and diminished by a Constant (0·9600 nearly).	Expressed in terms of Gauss's Unit measured on the Metrical System, and diminished by a Constant (4·2023 nearly).	Mean Temperature.
			°
January	0·0353	0·1545	62·0
February	·0351	·1536	62·2
March	·0347	·1519	62·2
April	·0344	·1506	62·5
May	·0342	·1497	63·1
June	·0346	·1514	65·4
July	·0357	·1563	68·9
August	·0342	·1497	68·4
September	·0307	·1344	65·3
October	·0309	·1352	65·9
November	·0280	·1226	62·7
December	·0274	·1200	62·6

The value 0·9600 of Vertical Force corresponds to 4·2023 of Gauss's Unit on the Metrical System.

TABLE XII.—MEAN, through the Range of Months, of the MONTHLY MEAN DETERMINATIONS of the DIURNAL INEQUALITIES of DECLINATION, HORIZONTAL FORCE, and VERTICAL FORCE for the Year 1876.

January to December.

Hour, Greenwich Mean Solar Time.	Inequality of Declination.	Equivalent in terms of Gauss's Unit measured on the Metrical System.	Inequality of Horizontal Force.	Equivalent in terms of Gauss's Unit measured on the Metrical System.	Inequality of Vertical Force.	Equivalent in terms of Gauss's Unit measured on the Metrical System.
h	′					
0	+ 3·81	+ 0·00199	− 0·00047	− 0·00084	− 0·00053	− 0·00232
	+ 4·53	+ 237	− 17	− 31	− 31	− 136
2	− 4·12	+ 215	+ 1	+ 2	− 12	− 53
3	+ 2·99	+ 156	+ 10	+ 18	+ 5	+ 22
4	+ 1·84	+ 96	+ 18	+ 32	+ 20	+ 88
5	+ 0·91	+ 48	+ 24	+ 43	+ 30	+ 131
6	+ 0·23	+ 12	+ 32	+ 58	+ 40	+ 175
7	− 0·27	− 14	+ 38	+ 68	+ 49	+ 214
8	− 0·78	− 41	+ 29	+ 52	+ 54	+ 236
9	− 1·14	− 60	+ 26	+ 47	+ 55	+ 241
10	− 1·38	− 72	+ 22	+ 40	+ 52	+ 228
11	− 1·38	− 72	+ 18	+ 32	+ 47	+ 206
12	− 1·23	− 64	+ 13	+ 23	+ 39	+ 171
13	− 1·08	− 56	+ 9	+ 16	+ 28	+ 123
14	− 0·98	− 51	+ 8	+ 14	+ 14	+ 61
15	− 0·98	− 51	+ 8	+ 14	0	0
16	− 1·21	− 63	+ 14	+ 25	− 13	− 57
17	− 1·56	− 82	+ 16	+ 29	− 24	− 105
18	− 1·91	− 100	+ 13	+ 23	− 35	− 153
19	− 2·21	− 116	+ 3	+ 5	− 42	− 184
20	− 2·31	− 121	− 24	− 43	− 46	− 201
21	− 1·75	− 91	− 57	− 102	− 51	− 223
22	− 0·07	− 4	− 74	− 133	− 62	− 271
23	+ 2·04	+ 107	− 70	− 126	− 67	− 293

ROYAL OBSERVATORY, GREENWICH.

INDICATIONS

OF

MAGNETOMETERS

DURING A MAGNETIC DISTURBANCE.

1876.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19		
h m	° ′ ″	
0. 0	19. 16. 0	·0397
0.10	16. 0	·0397
0.20	19. 2	·0414
0.29	18. 2	·0409
0.36	19. 3	·0415
0.47	18. 1	·0409
0.51	18. 6	·0411
1. 1	17. 1	·0403
1. 7	18. 7	·0412
1.14	18. 1	·0409
1.23	18. 8	·0412
1.30	18. 2	·0409
1.37	18. 7	·0412
1.45	17. 8	·0406
1.57	18. 7	·0412
2. 9	17. 8	·0406
2.16	17. 8	·0406
2.32	20. 6	·0421
2.44	19. 2	·0414
2.50	19. 8	·0417
3. 7	19. 0	·0413
3.22	17. 6	·0405
3.35	18. 8	·0412
3.40	18. 4	·0410
3.51	18. 3	·0410
4. 2	18. 8	·0412
4.13	20. 8	·0422
4.20	20. 5	·0421
4.30	21. 2	·0424
4.37	21. 1	·0424
4.50	20. 7	·0422
5.14	19. 0	·0413
5.34	12. 3	·0378
5.45	16. 5	·0400
5.57	19. 7	·0417
6. 4	17. 2	·0403
6.12	22. 0	·0428
6.22	12. 7	·0380
6.30	15. 1	·0393
6.40	11. 1	·0372
6.51	15. 1	·0393
7. 0	14. 9	·0392
7. 8	16. 5	·0400
7.20	6. 3	·0347
7.30	9. 0	·0361
7.38	7. 8	·0354
7.45	10. 1	·0367
7.52	9. 2	·0362
8.10	0. 0	·0314
8.21	4. 0	·0335
8.30	3. 8	·0334
8.39	6. 3	·0347

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19		
h m		
0. 0	·1513	·2719
0. 9	·1513	·2719
0.23	·1526	·2743
0.30	·1520	·2732
0.40	·1523	·2737
0.48	·1519	·2730
0.58	·1522	·2736
1. 5	·1516	·2725
1.14	·1523	·2737
1.22	·1522	·2736
1.27	·1525	·2741
1.36	·1522	·2736
1.42	·1524	·2739
1.52	·1523	·2737
2.12	·1527	·2745
2.37	·1533	·2754
3.15	·1523	·2737
3.38	·1521	·2734
3.48	·1523	·2737
4. 5	·1517	·2727
4.12	·1519	·2730
4.15	·1518	·2728
4.38	·1521	·2734
4.48	·1519	·2730
4.56	·1508	·2710
5. 4	·1511	·2716
5.28	·1490	·2678
5.44	·1507	·2709
5.46	·1503	·2701
5.52	·1507	·2709
5.55	·1505	·2705
6. 2	·1497	·2691
6.11	·1508	·2710
6.20	·1486	·2671
6.28	·1497	·2691
6.35	·1491	·2680
6.47	·1499	·2694
6.57	·1484	·2667
7. 2	·1486	·2671
7.11	·1460	·2624
7.29	·1478	·2656
7.38	·1474	·2649
7.42	·1483	·2665
8. 6	·1455	·2615
8.19	·1472	·2646
8.29	·1470	·2642
8.40	·1470	·2642
8.48	·1464	·2631
8.58	·1468	·2638
9. 3	·1465	·2633
9.10	·1468	·2638
9.18	·1465	·2633

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19		
h m		
0. 0	·0338	·1480
0.26	·0340	·1488
1. 6	·0340	·1488
1.17	·0342	·1497
1.41	·0343	·1501
2. 2	·0344	·1506
2.22	·0345	·1510
2.34	·0346	·1514
2.50	·0346	·1514
3. 7	·0347	·1519
3.47	·0349	·1527
4.46	·0350	·1532
5.26	·0353	·1545
5.55	·0357	·1563
6.11	·0361	·1580
6.22	·0359	·1571
6.29	·0362	·1585
6.48	·0361	·1580
7. 0	·0362	·1585
7.12	·0363	·1589
7.29	·0365	·1598
7.45	·0361	·1580
7.55	·0362	·1585
8.11	·0363	·1589
8.27	·0363	·1589
9.22	·0359	·1571
9.37	·0360	·1576
10.14	·0356	·1558
10.48	·0352	·1541
11.52	·0344	·1506
12. 8	·0350	·1532
12.35	·0335	·1467
13. 2	·0327	·1432
13.19	·0327	·1432
13.42	·0333	·1458
13.58	·0332	·1454
14.14	·0321	·1405
14.21	·0321	·1405
14.28	·0322	·1410
14.45	·0329	·1440
15. 0	·0326	·1427
15.20	·0328	·1436
15.45	·0321	·1405
16.15	·0329	·1440
16.45	·0337	·1476
17. 4	·0339	·1484
17.24	·0341	·1492
17.38	·0342	·1497
17.52	·0344	·1506
18.55	·0350	·1532
19.31	·0348	·1523
19.48	·0349	·1527

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19		
h m	° ′ ″	
8.55	19. 5. 2	·0341
9.10	0. 9	·0319
9.15	19. 1. 1	·0320
9.22	18. 59. 4	·0311
9.30	19. 0. 3	·0316
9.42	2. 0	·0324
9.55	1. 8	·0323
10. 0	2. 3	·0326
10.14	0. 0	·0314
10.25	1. 6	·0322
10.29	2. 2	·0325
10.44	4. 3	·0337
10.59	19. 2. 9	·0329
11. 9	18. 55. 9	·0293
11.12	55. 8	·0292
11.24	58. 0	·0303
11.33	57. 1	·0299
11.46	50. 0	·0261
11.54	45. 2	·0236
12. 3	18. 49. 9	·0261
12.27	19. 18. 7	·0412
12.32	17. 9	·0407
12.40	17. 4	·0404
12.43	17. 1	·0403
12.57	12. 6	·0379
13.11	8. 8	·0360
13.45	29. 7	·0469
14. 0	35. 3	·0499
14.20	11. 8	·0375
14.29	6. 9	·0350
14.50	24. 6	·0442
15. 0	22. 8	·0432
15.12	29. 0	·0465
15.18	29. 1	·0466
15.23	29. 5	·0468
15.49	16. 2	·0398
15.59	16. 7	·0401
16. 5	14. 9	·0392
16.10	14. 9	·0392
16.20	13. 9	·0387
16.41	14. 5	·0390
16.53	16. 5	·0400
17. 3	17. 5	·0405
17.14	15. 9	·0397
17.40	12. 3	·0378
17.58	13. 3	·0384
18.18	12. 0	·0376
18.30	12. 2	·0377
18.40	14. 0	·0387
18.48	15. 6	·0395
18.58	15. 0	·0392
19.12	17. 9	·0407

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19		
h m		
9.28	·1468	·2638
9.44	·1476	·2653
9.59	·1475	·2651
10.14	·1472	·2646
10.21	·1474	·2649
10.32	·1468	·2638
10.42	·1469	·2640
10.49	·1467	·2637
10.55	·1469	·2640
11. 4	·1464	·2631
11.14	·1470	·2642
11.20	·1468	·2638
11.29	·1479	·2658
11.40	·1464	·2631
11.48	·1463	·2629
12.18	·1555	·2794
12.34	·1557	·2798
12.43	·1554	·2792
13.26	·1436	·2581
13.47	·1459	·2622
14. 4	·1449	·2604
14.44	·1558	·2799
14.52	·1558	·2799
15. 1	·1547	·2780
15.14	·1543	·2772
15.22	·1546	·2778
16. 4	·1491	·2680
16.12	·1493	·2683
16.25	·1495	·2687
16.43	·1497	·2691
17. 0	·1502	·2700
17.36	·1485	·2669
17.55	·1492	·2682
18. 0	·1490	·2678
18. 4	·1492	·2682
18.14	·1489	·2676
18.49	·1502	·2700
19. 4	·1518	·2728
19. 7	·1514	·2721
19.13	·1519	·2730
19.54	·1465	·2633
20. 9	·1453	·2611
20.15	·1467	·2637
20.35	·1486	·2671
20.48	·1482	·2664
20.55	·1485	·2669
21. 2	·1479	·2658
21. 9	·1481	·2662
21.18	·1479	·2658
21.28	·1472	·2646
21.42	·1483	·2665
22. 2	·1474	·2649

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19		
h m		
20.13	·0349	·1527
20.43	·0349	·1527
21.14	·0352	·1541
21.28	·0351	·1536
21.38	·0353	·1545
22.46	·0352	·1541
23. 0	·0351	·1536
23.30	·0352	·1541
23.59	·0352	·1541

The symbol † denotes that there has been a break in the photographic record.

For the Horizontal and Vertical Forces, increasing readings denote increasing forces.

The constant by which the values of Horizontal Force are diminished is 0·8600 nearly, as expressed in parts of the whole Horizontal Force, equivalent to 1·5454 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2023 in terms of Gauss's Unit.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19			Feb. 19					
h m	° ′ ″		h m			h m		
19. 22	19. 18. 3	·0410	22. 16	·1479	·2658			
19. 30	19. 1	·0414	22. 43	·1496	·2689			
19. 48	26. 7	·0453	22. 58	·1501	·2698			
20. 1	30. 4	·0472		(†)				
20. 6	32. 3	·0483	23. 26	·1499	·2694			
20. 14	32. 3	·0483	23. 30	·1504	·2703			
20. 22	30. 6	·0473	23. 39	·1502	·2700			
20. 33	26. 3	·0451	23. 53	·1505	·2705			
20. 41	22. 6	·0431	23. 59	·1505	·2705			
20. 49	20. 8	·0422						
20. 59	21. 3	·0425						
21. 6	20. 5	·0421						
21. 12	21. 0	·0423						
21. 18	20. 4	·0420						
21. 23	20. 2	·0419						
21. 29	19. 5	·0416						
21. 40	23. 0	·0434						

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 19								
h m	° ′ ″		h m			h m		
21. 47	19. 23. 3	·0436						
21. 53	24. 4	·0441						
21. 59	23. 9	·0439						
22. 1	24. 5	·0442						
22. 10	23. 3	·0436						
22. 20	23. 2	·0435						
22. 31	23. 8	·0438						
22. 49	24. 0	·0439						
22. 50	21. 7	·0427						
22. 59	20. 0	·0418						
23. 4	20. 9	·0423						
	(†)							
23. 20	17. 8	·0406						
23. 27	22. 2	·0429						
23. 37	18. 4	·0410						
23. 56	21. 2	·0424						
23. 59	20. 2	·0419						

Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.
Feb. 19			Feb. 19		
h m	°	°	h m	°	°
0. 0	61·8	62·0	3. 0	62·2	62·7
1. 0	62·2	62·3	9. 0	62·4	62·6
2. 0	62·3	62·5	21. 45	61·6	62·3

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

OBSERVATIONS

OF THE

MAGNETIC DIP.

1876.

RESULTS of OBSERVATIONS of MAGNETIC DIP, on each Day of Observation.

Day and Approximate Hour, 1876.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″	
January 4. 2	D 1	3 inches	67.43.16	N
12. 0	C 1	6 ,,	67.41. 3	N
12. 1	C 2	6 ,,	67.42.18	N
18. 2	D 2	3 ,,	67.43.34	N
19. 1	B 1	9 ,,	67.41.52	N
22. 0	C 1	6 ,,	67.42.16	N
22. 2	D 1	3 ,,	67.44.49	N
24. 2	D 2	3 ,,	67.45. 1	N
25. 2	B 2	9 ,,	67.38.30	N
26. 23	C 2	6 ,,	67.43.33	N
29. 0	B 2	9 ,,	67.38.12	N
29. 2	B 1	9 ,,	67.39.10	N
31. 2	C 2	6 ,,	67.41. 9	N
February 4. 1	D 1	3 ,,	67.42. 5	N
9. 2	C 1	6 ,,	67.40.42	N
9. 22	B 1	9 ,,	67.41.33	N
10. 0	B 2	9 ,,	67.40.47	N
10. 3	B 1	9 ,,	67.40.16	N
18. 0	C 2	6 ,,	67.41.15	N
23. 2	D 2	3 ,,	67.43.52	N
23. 23	D 1	3 ,,	67.41.36	N
24. 1	C 1	6 ,,	67.41.33	N
29. 1	D 2	3 ,,	67.42. 8	N
March 4. 1	B 2	9 ,,	67.39.35	N
10. 2	C 1	6 ,,	67.38.51	N
10. 23	D 1	3 ,,	67.38.56	N
11. 1	B 1	9 ,,	67.39.40	N
18. 0	C 2	6 ,,	67.42.11	N
22. 23	C 1	6 ,,	67.40. 8	N
23. 1	D 1	3 ,,	67.39.59	N
24. 2	D 2	3 ,,	67.41. 4	N
29. 2	C 2	6 ,,	67.43.50	N
31. 1	D 1	3 ,,	67.38.28	N
31. 2	D 2	3 ,,	67.43.41	N
April 4. 2	C 2	6 ,,	67.40. 3	N
8. 0	C 1	6 ,,	67.38.33	N
15. 2	D 1	3 ,,	67.40.40	N
20. 1	B 1	9 ,,	67.41. 2	N
24. 2	D 2	3 ,,	67.40.30	N
25. 22	B 2	9 ,,	67.40.16	N
26. 2	C 1	6 ,,	67.40.16	N
27. 22	B 2	9 ,,	67.41. 2	N
28. 3	B 2	9 ,,	67.40.14	N
29. 1	D 2	3 ,,	67.42. 8	N
May 5. 2	C 2	6 ,,	67.40.36	N
9. 3	D 1	3 ,,	67.40.57	N
11. 1	B 1	9 ,,	67.38.47	N
18. 2	D 2	3 ,,	67.43.53	N
18. 23	B 2	9 ,,	67.39. 0	N
19. 2	C 1	6 ,,	67.41.29	N
25. 2	D 1	3 ,,	67.41. 8	N
27. 1	D 2	3 ,,	67.42.10	N
29. 22	B 2	9 ,,	67.38.35	N
30. 23	C 2	6 ,,	67.39. 9	N
June 6. 23	B 1	9 inches	67.39.50	N
7. 1	C 1	6 ,,	67.39.31	N
10. 1	D 1	3 ,,	67.43. 2	N
13. 2	D 2	3 ,,	67.43. 6	N
13. 23	C 2	6 ,,	67.41.18	N
20. 23	B 2	9 ,,	67.38.43	N
21. 2	C 1	6 ,,	67.39.21	N
27. 1	C 2	6 ,,	67.42.14	N
27. 22	B 1	9 ,,	67.42.21	N
28. 1	C 1	6 ,,	67.39.57	N
28. 3	B 1	9 ,,	67.39.40	N
July 4. 22	D 1	3 ,,	67.41.36	N
5. 0	C 2	6 ,,	67.41. 9	N
5. 1	D 2	3 ,,	67.40.13	N
5. 3	D 1	3 ,,	67.40.32	N
8. 2	D 2	3 ,,	67.42.24	N
13. 0	C 2	6 ,,	67.41. 0	E
14. 0	B 1	9 ,,	67.38.59	E
17. 23	B 2	9 ,,	67.38.25	N
25. 2	C 1	6 ,,	67.40.12	N
26. 2	B 1	9 ,,	67.41. 5	N
August 2. 2	C 1	6 ,,	67.38.34	N
8. 2	D 1	3 ,,	67.40. 2	N
10. 2	D 2	3 ,,	67.43.34	N
12. 1	B 1	9 ,,	67.41. 9	N
15. 2	C 2	6 ,,	67.39.16	N
16. 0	B 2	9 ,,	67.38.17	N
22. 22	C 1	6 ,,	67.40.15	N
23. 0	C 2	6 ,,	67.40.50	N
23. 3	C 1	6 ,,	67.37.15	N
28. 23	D 1	3 ,,	67.43.27	N
29. 0	B 2	9 ,,	67.39.42	N
29. 2	B 1	9 ,,	67.39. 1	N
29. 3	D 2	3 ,,	67.43.48	N
September 6. 0	D 1	3 ,,	67.43.13	N
8. 2	B 1	9 ,,	67.38.30	N
11. 2	C 2	6 ,,	67.40.44	N
12. 0	B 2	9 ,,	67.37.54	N
12. 1	B 1	9 ,,	67.39.22	N
12. 2	D 2	3 ,,	67.42.18	N
15. 0	C 1	6 ,,	67.42.34	E
18. 23	C 1	6 ,,	67.40.22	E
27. 0	B 2	9 ,,	67.40.12	N
27. 2	D 1	3 ,,	67.42.12	N
October 3. 2	D 2	3 ,,	67.42.47	N
11. 2	C 2	6 ,,	67.42.19	N
11. 23	B 1	9 ,,	67.41.56	N
12. 1	C 1	6 ,,	67.41.48	N
17. 2	D 1	3 ,,	67.42. 1	E
19. 1	B 2	9 ,,	67.38.52	N
21. 1	C 2	6 ,,	67.41.43	N
25. 2	B 2	9 ,,	67.39.38	N
26. 23	B 1	9 ,,	67.39.40	N

The initials E and N are those of Mr. Ellis and Mr. Nash.

RESULTS of OBSERVATIONS of MAGNETIC DIP, on each Day of Observation—*continued.*

Day and Approximate Hour, 1876.	Needle.	Length of Needle.	Magnetic Dip.	Observer.	Day and Approximate Hour, 1876.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″		d h			° ′ ″	
October 27. 0	C 2	6 inches	67. 41. 26	N	December 5. 23	C 1	6 inches	67. 39. 1	N
27. 2	D 2	3 „	67. 41. 4	N	9. 1	D 2	3 „	67. 41. 4	N
31. 0	B 2	9 „	67. 39. 8	N	14. 0	C 2	6 „	67. 42. 57	N
					14. 2	D 1	3 „	67. 41. 15	N
November 2. 2	D 1	3 „	67. 41. 50	N	19. 2	C 2	6 „	67. 41. 4	N
7. 2	D 2	3 „	67. 42. 35	N	21. 0	B 1	9 „	67. 38. 26	N
11. 1	C 1	6 „	67. 40. 33	N	21. 2	D 2	3 „	67. 43. 35	N
17. 2	D 2	3 „	67. 42. 29	N	21. 22	B 2	9 „	67. 38. 18	N
23. 0	B 1	9 „	67. 39. 11	N	22. 0	D 1	3 „	67. 42. 7	N
23. 2	C 2	6 „	67. 41. 27	N	22. 2	B 2	9 „	67. 40. 35	N
24. 0	B 2	9 „	67. 38. 2	N	29. 2	C 1	6 „	67. 41. 18	N
28. 0	D 1	3 „	67. 43. 31	N	30. 1	B 1	9 „	67. 39. 29	N
28. 2	B 1	9 „	67. 39. 39	N					
29. 0	B 2	9 „	67. 39. 10	N					

The initial N is that of Mr. Nash.

MONTHLY MEANS of MAGNETIC DIPS.

Month, 1876.	B 1, 9-inch Needle.	Number of Observations.	B 2, 9-inch Needle.	Number of Observations.	C 1, 6-inch Needle.	Number of Observations.
	° ′ ″		° ′ ″		° ′ ″	
January	67. 40. 31	2	67. 38. 21	2	67. 41. 40	2
February	67. 40. 55	2	67. 40. 47	1	67. 41. 8	2
March	67. 39. 40	1	67. 39. 35	1	67. 39. 30	2
April	67. 41. 2	1	67. 40. 31	3	67. 39. 25	2
May	67. 38. 47	1	67. 38. 47	2	67. 41. 29	1
June	67. 40. 37	3	67. 38. 43	1	67. 39. 36	3
July	67. 40. 2	2	67. 38. 25	1	67. 40. 12	1
August	67. 40. 5	2	67. 39. 0	2	67. 38. 41	3
September	67. 38. 56	2	67. 39. 3	2	67. 41. 28	2
October	67. 40. 48	2	67. 39. 13	3	67. 41. 48	1
November	67. 39. 25	2	67. 38. 36	2	67. 40. 33	1
December	67. 38. 58	2	67. 39. 26	2	67. 40. 10	2
Means	67. 40. 2	Sum 22	67. 39. 14	Sum 22	67. 40. 15	Sum 22

Month, 1876.	C 2, 6-inch Needle.	Number of Observations.	D 1, 3-inch Needle.	Number of Observations.	D 2, 3-inch Needle.	Number of Observations.
	° ′ ″		° ′ ″		° ′ ″	
January	67. 42. 20	3	67. 44. 3	2	67. 44. 18	2
February	67. 41. 15	1	67. 41. 51	2	67. 43. 0	2
March	67. 43. 1	2	67. 39. 8	3	67. 42. 23	2
April	67. 40. 3	1	67. 40. 40	1	67. 41. 19	2
May	67. 39. 53	2	67. 41. 3	2	67. 43. 1	2
June	67. 41. 46	2	67. 43. 2	1	67. 43. 6	1
July	67. 41. 5	2	67. 41. 4	2	67. 41. 18	2
August	67. 40. 3	2	67. 41. 45	2	67. 43. 41	2
September	67. 40. 44	1	67. 42. 43	2	67. 42. 18	1
October	67. 41. 49	3	67. 42. 1	1	67. 41. 56	2
November	67. 41. 27	1	67. 42. 40	2	67. 42. 32	2
December	67. 42. 0	2	67. 41. 41	2	67. 42. 20	2
Means	67. 41. 26	Sum 22	67. 41. 40	Sum 22	67. 42. 35	Sum 22

For this table the monthly means have been formed without reference to the hour at which the observation was made on each day. In combining the monthly results, to form the annual means, weights have been given proportional to the number of observations.

YEARLY MEANS of MAGNETIC DIPS for each of the NEEDLES, and GENERAL MEAN for the Year 1876.

Lengths of the several Sets of Needles.	Needles.	Number of Observations with each Needle.	Mean Yearly Dips from Observations with each Needle.	Mean Yearly Dips from each Set of Needles.	Mean Yearly Dip from all the Sets of Needles.
			° ′ ″	° ′ ″	° ′ ″
9-inch Needles	B 1	22	67. 40. 2	67. 39. 38	
	B 2	22	67. 39. 14		
6-inch Needles	C 1	22	67. 40. 15	67. 40. 50	67. 40. 52
	C 2	22	67. 41. 26		
3-inch Needles	D 1	22	67. 41. 40	67. 42. 7	
	D 2	22	67. 42. 35		

RESULTS of OBSERVATIONS of MAGNETIC DIP at the Hours of Observation 9^h. a.m. and 3^h. p.m.

Month and Day, 1876.		Needle.	Length of Needle.	Magnetic Dip. At 9^h. a.m. ±	Magnetic Dip. At 3^h. p.m. ±	Excess of the Magnetic Dip at 9^h. a.m. over the Magnetic Dip at 3^h. p.m.
				° ′ ″	° ′ ″	′ ″
February	10	B 1	9 inches	67. 41. 33	67. 40. 16	+ 1. 17
April	28	B 2	9 ,,	67. 41. 2	67. 40. 14	+ 0. 48
June	28	B 1	9 ,,	67. 42. 21	67. 39. 40	+ 2. 41
July	5	D 1	3 ,,	67. 41. 36	67. 40. 32	+ 1. 4
August	23	C 1	6 ,,	67. 40. 15	67. 37. 15	+ 3. 0
December	22	B 2	9 ,,	67. 38. 18	67. 40. 35	− 2. 17
Means		....		67. 40. 51	67. 39. 45	+ 1. 6

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

DEFLEXION OF A MAGNET

FOR

ABSOLUTE MEASURE

OF

HORIZONTAL FORCE.

1876.

ABSTRACT of the OBSERVATIONS of DEFLEXION of a MAGNET for ABSOLUTE MEASURE of HORIZONTAL FORCE.

Month and Day, 1876.		Distances of Centers of Magnets.	Temperature.	Observed Deflexion.	Mean of the Times of Vibration of Deflecting Magnet.	Number of Vibrations.	Temperature.	Observer.
		ft.	°	° ′ ″	s		°	
January	27	1·0 1·3	54·3	11. 14. 37 5. 5. 48	5·546 5·547	100 100	54·0 58·0	N
February	28	1·0 1·3	55·7	11. 14. 11 5. 5. 36	5·552 5·543	100 100	55·2 56·6	N
March	28	1·0 1·3	55·0	11. 14. 8 5. 5. 46	5·548 5·550	100 100	53·9 56·3	N
April	28	1·0 1·3	58·9	11. 13. 55 5. 5. 34	5·548 5·549	100 100	58·9 60·0	N
May	30	1·0 1·3	72·1	11. 10. 49 5. 4. 7	5·550 5·559	100 100	73·6 75·2	N
June	30	1·0 1·3	69·2	11. 11. 45 5. 4. 30	5·556 5·550	100 100	64·9 71·0	N
July	29	1·0 1·3	69·9	11. 10. 15 5. 4. 6	5·557 5·561	100 100	68·6 72·6	N
August	26	1·0 1·3	64·6	11. 9. 29 5. 3. 28	5·557 5·563	100 100	65·0 68·9	N
September	26	1·0 1·3	65·5	11. 9. 26 5. 3. 26	5·568 5·564	100 100	64·3 68·0	N
October	26	1·0 1·3	54·5	11. 10. 26 5. 3. 54	5·564 5·563	100 100	54·0 56·0	N
November	29	1·0 1·3	51·0	11. 9. 44 5. 3. 54	5·562 5·558	100 100	52·8 51·3	N
December	20	1·0 1·3	45·0	11. 10. 44 5. 4. 4	5·563 5·562	100 100	45·2 45·8	N

The position of the Deflecting Magnet with regard to the suspended Magnet is always that which was formerly termed "Lateral." The Deflecting Magnet is placed on the East side of the suspended Magnet, with its marked pole alternately E. and W., and it is placed on the West side with its pole alternately E. and W.; and the deflexion in the table above is the mean of the four deflexions observed in those positions of the magnets.

The lengths of 1 foot and 1·3 foot answer to 304·8 and 396·2 millimètres respectively.

The initial N is that of Mr. Nash.

In the following calculations every observation is reduced to the temperature 35°.

COMPUTATION of the VALUES of ABSOLUTE MEASURE of HORIZONTAL FORCE in the Year 1876.

Month and Day, 1876.		In English Measure.									Value of X in Metric Measure.
		Apparent Value of A_1.	Apparent Value of A_2.	Apparent Value of P.	Mean Value of P.	Log. $\frac{m}{X}$	Adopted Time of Vibration of Deflecting Magnet.	Log. m X.	Value of X.	Value of m.	
January	27	+0·09779	0·09788	−0·00226	−0·00272	8·99144	5·5465	0·17282	3·897	0·3821	1·797
February	28	+0·09776	0·09784	−0·00221		8·99127	5·5475	0·17263	3·897	0·3819	1·797
March	28	+0·09774	0·09788	−0·00367		8·99131	5·5490	0·17222	3·895	0·3817	1·796
April	28	+0·09777	0·09789	−0·00289		8·99140	5·5485	0·17263	3·896	0·3820	1·796
May	30	+0·09755	0·09765	−0·00244		8·99040	5·5545	0·17269	3·901	0·3815	1·799
June	30	+0·09764	0·09772	−0·00216		8·99075	5·5530	0·17249	3·898	0·3816	1·797
July	29	+0·09743	0·09761	−0·00436		8·99003	5·5590	0·17171	3·898	0·3810	1·797
August	26	+0·09723	0·09731	−0·00199		8·98893	5·5600	0·17137	3·901	0·3803	1·799
September	26	+0·09724	0·09732	−0·00192		8·98896	5·5660	0·17040	3·897	0·3799	1·797
October	26	+0·09720	0·09728	−0·00197		8·98877	5·5635	0·17003	3·896	0·3797	1·796
November	29	+0·09704	0·09722	−0·00453		8·98830	5·5600	0·17054	3·900	0·3797	1·798
December	20	+0·09709	0·09718	−0·00225		8·98830	5·5625	0·16969	3·897	0·3793	1·797
Means........		..	..	..	..	..	..	..	3·898	..	1·797

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

METEOROLOGICAL OBSERVATIONS.

1876.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer, with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Jan. 1	..	29·848	47·2	33·0	40·3	38·9	51·8	27·0	44·5	42·7	1·4	3·1	0·0	+ 3·1	SSW	SW : N : NNE	2·8	0·0	0·9	355	0·16
2	..	29·949	50·5	28·5	38·9	37·3	50·5	22·0	44·6	42·3	1·6	2·3	0·0	+ 2·0	NNE : SE	SSE : S : SW	2·7	0·0	0·4	225	0·09
3	In Equator	29·980	53·9	45·0	50·3	48·4	57·3	38·7	44·5	42·7	1·9	4·0	1·1	+13·6	WSW : W	W : WSW	2·2	0·0	0·4	355	0·04
4	First Qr.	30·122	46·0	36·8	41·6	40·5	48·5	34·0	45·3	43·3	1·1	2·7	0·0	+ 5·0	WSW : W	ESE	0·8	0·0	0·0	185	0·00
5	..	30·227	37·2	26·0	31·4	28·2	73·2	20·0	44·5	42·9	3·2	5·8	0·5	− 5·1	SE	ESE : E	0·5	0·0	0·0	135	0·00
6	..	30·259	32·1	23·3	28·8	22·7	35·0	18·0	44·3	42·3	6·1	8·8	0·0	− 7·6	ESE : NE	NE : ENE	2·3	0·0	0·2	213	0·00
7	..	30·016	33·6	27·0	30·2	26·5	35·5	27·0	43·8	41·6	3·7	10·1	0·3	− 6·1	NE	NE : E	7·1	0·0	1·4	537	0·11
8	..	29·869	27·6	17·4	22·7	15·3	34·0	14·0	43·3	40·1	7·4	11·2	4·1	−13·6	ENE : E	ESE	9·0	0·0	0·5	280	0·01
9	Greatest Declination N.	29·951	33·1	22·5	29·6	24·4	35·1	20·9	40·5	37·9	5·2	6·0	3·2	− 6·7	N	N	2·7	0·0	0·2	251	0·00
10	Perigee	30·147	34·6	29·1	31·9	26·3	36·5	25·5	38·8	36·3	5·6	7·4	3·0	− 4·4	NE : NNE	N : NNW	2·3	0·0	0·2	273	0·00
11	Full	30·024	34·1	27·0	30·4	24·4	45·5	24·5	38·1	35·5	6·0	8·6	2·0	− 5·9	W : NW : NNW	N : NE	3·9	0·0	0·4	340	0·02
12	..	30·003	33·4	19·6	26·4	21·1	60·5	17·7	37·3	34·1	5·3	10·5	1·3	− 9·9	NNE : SW	SW : S	0·3	0·0	0·0	163	0·13
13	..	30·122	34·3	28·8	31·3	26·3	41·8	28·8	37·3	34·3	5·0	7·4	3·0	− 5·1	ESE : ENE : NE	NNE : NE	6·7	0·0	1·0	357	0·01
14	..	30·299	35·0	31·1	33·2	28·8	36·3	30·8	36·9	34·3	4·4	5·4	2·4	− 3·2	NNE	NE : NNE	8·2	0·0	1·4	524	0·00
15	..	30·452	34·2	29·0	31·8	28·2	39·0	29·0	36·5	34·5	3·6	5·0	1·9	− 4·7	NE : ENE	NE	2·1	0·0	0·1	259	0·00
16	In Equator	30·342	34·0	24·3	27·9	24·0	41·8	24·3	36·3	34·3	3·9	4·5	2·8	− 8·7	SW	SW	0·5	0·0	0·0	213	0·00
17	..	30·099	45·4	34·0	40·0	39·5	55·0	32·0	35·3	33·8	0·5	0·9	0·2	+ 3·3	SW	SW	2·6	0·0	0·1	267	0·02
18	Last Qr.	29·985	49·2	38·8	44·2	37·6	70·3	30·5	37·3	34·6	6·6	10·1	0·9	+ 7·4	SW : WSW : W	W : WSW : SW	3·7	0·0	0·4	350	0·01
19	..	29·975	46·7	39·2	43·2	38·7	71·5	36·0	40·3	36·8	4·5	9·4	1·8	+ 6·2	SW	SW : SSW : S	3·5	0·0	0·6	370	0·00
20	..	29·668	46·4	42·0	43·5	40·6	51·3	41·7	38·8	36·3	2·9	4·0	2·2	+ 6·3	S : SSW	S	8·3	0·2	0·8	496	0·00
21	..	29·487	45·6	34·3	41·3	39·7	49·8	32·5	39·1	36·8	1·6	4·0	0·7	+ 4·0	S : SSE	SE : N	6·0	0·0	0·3	308	0·47
22	Apogee	30·112	40·0	32·0	36·1	32·1	72·2	29·0	39·9	37·1	4·0	6·9	2·7	− 1·3	NNE : N	N : NNW : S	11·2	0·0	1·1	328	0·03
23	Greatest Declination S.	30·300	44·0	29·8	36·9	31·0	75·3	26·0	41·3	38·3	5·9	7·5	2·9	− 0·6	S : SSW	SSW	7·0	0·0	0·3	351	0·00
24	..	30·368	50·9	36·3	43·8	38·5	80·0	30·2	40·7	38·9	5·3	11·0	2·2	+ 6·1	SSW : S : SW	SW : SSW : S : SSE	3·3	0·0	0·4	347	0·00
25	..	30·281	47·5	27·7	36·8	33·5	79·0	26·3	41·3	39·1	3·3	9·7	0·7	− 1·1	Variable	E : SE	0·0	0·0	0·0	122	0·00
26	New	30·193	48·5	30·5	40·7	38·2	64·5	24·0	40·3	38·5	2·5	5·0	0·0	+ 2·7	S	SSW : S : SW	0·5	0·0	0·0	156	0·00
27	..	30·152	53·0	39·2	45·2	41·7	90·0	32·1	39·8	37·5	3·5	9·4	0·7	+ 7·0	S : SSE : SE	SE : SSE : S	0·0	0·0	0·0	133	0·00
28	..	30·139	49·8	32·7	40·4	39·5	72·7	29·6	40·1	38·1	0·9	3·6	0·0	+ 2·2	Variable	NE : E	0·2	0·0	0·0	91	0·00
29	..	30·161	50·0	26·5	37·5	32·7	88·8	25·7	40·1	38·5	4·8	10·9	1·2	− 0·8	Variable	ENE : SE	0·0	0·0	0·0	97	0·00
30	In Equator	30·183	49·6	30·9	43·4	40·3	62·0	24·9	40·3	39·1	3·1	5·5	0·8	+ 5·0	SSE : S	S	1·5	0·0	0·2	257	0·01
31	..	30·217	56·1	42·3	48·5	42·5	93·5	36·6	40·3	39·1	6·0	11·6	1·7	+10·0	SSW : S	S : SSE	0·6	0·0	0·1	271	0·00
Means	..	30·095	42·7	31·1	37·0	33·1	58·0	27·7	40·4	38·1	3·9	6·8	1·4	0·0	...	...	..	..	..	Sum 8609	Sum 1·11

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·020 on the 2nd; the first minimum in the month was 29in·813 on the 1st.
The second maximum ,, was 30in·272 on the 6th; the second minimum ,, was 29in·850 on the 2nd.
The third maximum ,, was 30in·158 on the 10th; the third minimum ,, was 29in·852 on the 8th.
The fourth maximum ,, was 30in·115 on the 11th; the fourth minimum ,, was 29in·978 on the 11th.
The absolute maximum ,, was 30in·462 on the 15th; the fifth minimum ,, was 29in·920 on the 12th.
The sixth maximum ,, was 30in·084 on the 18th; the sixth minimum ,, was 29in·923 on the 18th.
The seventh maximum ,, was 30in·439 on the 24th; the absolute minimum ,, was 29in·447 on the 21st.
The eighth maximum ,, was 30in·260 on the 31st; the eighth minimum ,, was 30in·122 on the 27th.
The range in the month was 1in·015.
The mean for the month was 30in·095, being 0in·360 *higher* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 56°·1 on the 31st; the lowest was 17°·4 on the 8th.
The range ,, was 38°·7.
The mean ,, of all the highest daily readings was 42°·7, being 0°·7 *lower* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 31°·1, being 2°·7 *lower* than the average of the preceding 35 years.
The mean daily range was 11°·6, being 2°·0 *greater* than the average of the preceding 35 years.
The mean for the month was 37°·0, being 1°·5 *lower* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Jan. 1	0 : w, g.-cur	0 : m, g.-cur	v : 10	10, r : v
2	m : m	m : 0	v : 10, h.-fr, f	10, oc.-r : 10, r
3	0 : 0	0 : w	10 : 10, r : 10	10, sh.-r : 9, ci.-cu, cu.-s
4	w : m, g.-cur	m, g.-cur : 0	10 : 10, f, glm	10, f : 10 : 10
5	0 : w	m : 0	10 : 10, th.-cl	1, ci, ci.-s : 1, li.-cl : 0, h.-fr
6	0 : 0	0 : 0	h.-fr : f, h.-fr : 10, sn	10 : 10, sn : 10, oc.-sn
7	0 : 0	0 : 0	10, w : 10 : 9, sn, w	10, sn, w : 10, sn, w : 10, sn, w
8	0 : 0	0 : w	10, sn, w : 10, sn, w : v, sn, w	10, cu.-s, ci : v : v, f
9	0 : 0	0 : m, g.-cur	f : 10 : 10	10 : v, sc
10	m : 0	w : w	v : 10	10 : 10 : 10, sl.-mt
11	0 : 0	0 : m	10 : sn : v, ci	10, oc.-sn, w : 10, sl.-sn : 10
12	m	m, P : m, g.-cur	v : v, ci, mt	v, cu, ci.-s, ci : 10, sn : 10, sn
13	0	0	10, sn : 10	10, ci, ci.-cu, cu.-s, w : 10, w : 10, w
14	0	0	10, w : 10, w	10, w : 10 : 10
15	0	0	10 : 10 : 10, sl.-sn	10 : 10 : 10
16	0	0	10 : 10, h.-fr	10 : 10, f
17	0	0	10, f : 10, f, sl.-r	10, th.-r, mt : 10, th.-r : 10, r
18	0	0	10 : 10, sl.-r : 8, ci.-cu	4, ci, ci.-cu : 3, ci, ci.-cu, f : 9
19	0	0	10 : 10 : v, ci.-cu	10, sc : 10, th.-r
20	0	0	10, w : 10 : 10, w, oc.-th.-r	10 : 10
21	0 : N, g.-cur	0 : w	10 : 10 : 10, r	10, r : 10, r, w
22	0	0	10, st.-w : v, ci.-cu	8, cu, ci : 8, cu.-s, ci, f : vv, mt
23	0	0	v : li.-cl, h.-fr	li.-cl
24	0	0	ci, ci.-s	cu, ci.-s, ci : 10 : 10, th.-r
25	0	0	v : li.-cl, f, h.-fr	0, f : 0 : 0
26	0	0	ci, ci.-cu : v, ci.-cu, ci, ci.-s	v, ci.-cu, ci.-s, ci : 10
27	0	0	f : 1, ci, ci.-s	v, ci, ci.-s, ci.-cu : li.-cl
28	0 : w	w : 0 : 0	li.-cl : 6, ci.-s, ci, th.-f	7, ci, ci.-s, cu, ci.-cu, f : 0 : 0, f
29	0	0	0, f, h.-fr	0, f : 0 : 0, h.-fr
30	0	0	0, h.-fr : 10	10, th.-r
31	0 : w	0	10 : 5, cu.-s, ci.-cu, ci, ci.-s	3, ci, ci.-s : 10, ci, ci.-s, lu.-co

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 33°·1, being 1°·7 *lower* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0in·188, being 0in·018 *less* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2grs·2, being 0gr·2 *less* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 86 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 562 grains, being 9 grains *greater* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·6.

WIND.

The proportions were of N. 7, S. 11, W. 5, E. 8, and Calm 0. The greatest pressure in the month was 11lbs·2 on the square foot on the 22nd. The mean daily horizontal movement of the air for the month was 278 miles; the greatest, 537 miles on the 7th; and the least, 91 miles on the 28th.

RAIN.

Fell on 13 days in the month, amounting to 1in·11, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·80 *less* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	
Feb. 1	..	29·979	48·0	40·9	43·5	35·7	54·8	37·2	41·5	39·5	7·8	10·1	5·7	+ 4·9	SSE	SSE	0·8	0·0	0·1	278	0·00
2	..	30·052	48·4	36·7	42·1	35·0	87·7	30·0	41·5	39·7	7·1	12·2	4·0	+ 3·4	S : WNW	W : SW	1·7	0·0	0·2	306	0·10
3	First Qr.	30·065	48·5	35·1	41·6	37·7	82·1	29·9	41·8	40·1	3·9	8·6	2·3	+ 2·8	SW : SSW	SSW	3·6	0·0	0·6	406	0·03
4	..	29·794	42·2	33·0	36·8	30·3	62·5	28·0	42·1	40·3	6·5	11·5	2·3	− 2·1	SW : W : NW	NW : NNW	3·8	0·0	0·7	334	0·03
5	..	29·701	39·4	31·3	35·1	32·3	51·0	27·6	42·1	40·3	2·8	5·5	1·5	− 3·9	NNW	NNW	4·0	0·0	0·8	298	0·03
6	Greatest Declination N.	29·707	39·0	30·9	34·6	30·3	55·7	28·2	41·5	39·9	4·3	7·8	2·2	− 4·5	N	NNE	9·7	0·0	1·3	432	0·02
7	Perigee	29·731	37·8	32·5	34·4	29·2	67·6	32·0	41·1	39·5	5·2	7·0	3·4	− 4·7	NNE : N	NNE	5·0	0·0	1·0	405	0·01
8	..	29·718	35·9	31·9	33·8	30·6	45·0	31·0	40·5	38·8	3·2	4·8	0·6	− 5·3	N	N	3·5	0·0	0·4	247	0·00
9	Full	29·703	37·3	28·0	32·6	27·5	51·3	26·7	39·9	38·1	5·1	9·1	1·7	− 6·5	N : NE	ENE : ESE : E	0·1	0·0	0·0	117	0·00
10	..	29·745	37·1	24·0	30·1	23·4	80·8	18·2	39·3	37·5	6·7	13·0	0·0	− 8·9	NE : N	N : NE	0·3	0·0	0·0	99	0·00
11	..	29·703	28·9	23·0	25·7	25·7	35·4	17·0	39·1	36·8	0·0	0·0	0·0	−13·3	N : SSE	Variable	0·0	0·0	0·0	49	0·00
12	In Equator	29·695	36·9	23·2	29·4	26·1	87·2	19·5	38·3	36·1	3·3	7·3	0·0	− 9·5	SW	WSW : SW : SSW	0·0	0·0	0·0	152	0·00
13	..	29·491	37·1	21·8	29·6	26·7	85·2	17·0	37·8	35·8	2·9	8·1	0·0	− 9·3	SSW : SSE : SE	SE : E	0·3	0·0	0·0	147	0·21
14	..	29·469	46·9	30·0	39·7	37·2	91·3	30·0	37·5	35·3	2·5	9·2	0·0	+ 0·9	SW : WSW	WSW : SSW	4·8	0·0	0·3	296	0·05
15	..	29·335	51·5	43·6	46·7	44·5	70·0	40·5	37·7	35·7	2·2	3·1	0·6	+ 8·0	SSW	SW	8·6	0·0	1·9	552	0·08
16	..	29·530	51·8	43·4	47·1	42·2	65·0	39·0	38·7	37·1	4·9	7·8	2·2	+ 8·4	SW : WSW	WSW : SW	7·5	0·1	1·8	569	0·05
17	Last Qr.	29·510	54·2	45·7	50·6	48·6	57·0	44·8	38·7	37·1	2·0	4·0	0·8	+11·9	SW	WSW	7·0	0·0	1·9	548	0·12
18	..	29·236	59·0	46·4	51·1	44·1	102·3	42·3	40·5	38·7	7·0	11·4	2·9	+12·3	SW	SW	9·7	0·0	2·2	586	0·09
19	Apogee Greatest Dec. S	29·254	53·2	42·2	46·7	38·8	100·8	40·0	41·7	40·3	7·9	14·6	1·8	+ 7·9	WSW	WSW	10·3	0·0	1·8	525	0·01
20	..	29·547	43·7	37·9	41·2	37·9	54·0	37·9	45·1	42·7	3·3	6·6	0·9	+ 2·3	SE : E	SE	0·0	0·0	0·0	120	0·13
21	..	29·621	54·3	42·1	49·6	47·8	63·0	39·9	45·9	43·9	1·8	5·2	0·0	+10·6	SSE : SW	SW : WSW	24·7	0·0	3·0	592	0·24
22	..	29·664	56·0	45·0	49·4	43·3	101·6	41·0	47·3	45·3	6·1	10·3	4·2	+10·3	WSW	SW	11·3	0·6	2·9	617	0·00
23	..	29·570	49·6	38·7	44·0	36·6	79·8	32·8	47·8	46·1	7·4	11·7	4·8	+ 4·8	SW : WSW	W	9·6	0·1	3·4	655	0·00
24	..	29·887	46·7	33·7	39·0	28·1	90·8	27·8	47·1	45·3	10·9	15·5	7·4	− 0·3	WSW	WNW : WSW	5·6	0·0	1·0	412	0·00
25	New	29·566	47·4	34·2	41·7	39·2	62·0	28·8	46·3	44·3	2·5	6·2	1·3	+ 2·2	SSW : SE : S	SSW	1·9	0·0	0·2	288	0·16
26	..	29·315	53·0	44·2	47·6	43·5	97·2	41·8	46·1	43·8	4·1	8·6	2·0	+ 7·9	W : WSW	SW : WSW	8·7	0·0	1·3	515	0·02
27	In Equator	29·343	51·9	43·3	46·8	43·3	57·8	38·8	45·3	43·8	3·5	6·3	1·1	+ 6·9	W : WSW : SW : SSW	WSW : W	5·3	0·0	0·9	452	0·09
28	..	29·645	58·0	42·2	49·8	46·0	97·1	36·9	45·3	43·8	3·8	11·2	0·0	+ 9·7	WSW : SW : W	W : WSW	2·3	0·0	0·5	436	0·00
29	..	29·621	58·2	44·6	50·4	47·3	81·6	40·3	45·3	43·8	3·1	8·7	0·8	+10·2	WSW : SW	WSW : W : SW	4·1	0·0	0·7	437	0·03
Means	..	29·627	46·6	36·2	41·1	36·5	73·0	32·6	42·2	40·3	4·5	8·5	1·9	+ 2·0	...	...	..	..	..	Sum 10870	Sum 1·50

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute maximum in the month was 30in·164 on the 2nd; the first minimum in the month was 29in·926 on the 1st.
The second maximum ,, was 29in·789 on the 7th; the second minimum ,, was 29in·653 on the 5th.
The third maximum ,, was 29in·492 on the 14th; the third minimum ,, was 29in·361 on the 13th.
The fourth maximum ,, was 29in·567 on the 16th; the fourth minimum ,, was 29in·297 on the 15th.
The fifth maximum ,, was 29in·680 on the 20th; the absolute minimum ,, was 29in·065 on the 18th.
The sixth maximum ,, was 29in·723 on the 22nd; the sixth minimum ,, was 29in·593 on the 21st.
The seventh maximum ,, was 29in·925 on the 24th; the seventh minimum ,, was 29in·522 on the 23rd.
The eighth maximum ,, was 29in·711 on the 28th; the eighth minimum ,, was 29in·195 on the 26th.
The ninth maximum ,, was 29in·703 on the 29th; the ninth minimum ,, was 29in·598 on the 29th.
The range in the month was 1in·099.
The mean for the month was 29in·627, being 0in·172 *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 59°·0 on the 18th; the lowest was 21°·8 on the 13th.
The range ,, was 37°·2.
The mean ,, of all the highest daily readings was 46°·6, being 1°·3 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 36°·2, being 2°·2 *higher* than the average of the preceding 35 years.
The mean daily range was 10°·4, being 0°·9 *less* than the average of the preceding 35 years.
The mean for the month was 41°·1, being 1°·9 *higher* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Feb. 1	o	w : o	4, ci.-s : 10	10, cu.-s, cu. ci : v
2	o : w	w	10 : 10, r : v, cu.-s, th.-cl	3, cu, ci, li.-cl : o
3	w	o	h.-fr : o, h.-fr : v,ci,ci.-s,li.-cl,so.-ha	9, cu.-s, ci.-s, th.-cl : 9, th.-cl, r, lu.-ha
4	o : w	o	9 : 10, r : 6,cu,ci.-cu,ci,mt	3, ci.-cu, cu, ci, li.-cl : v, ci.-s, ci
5	o	o	v : v : vv, sl	vv, cu.-s, cu : v, sn
6	o	o	v : v : v, sc, sl.-sn	10, sn, w : 10, sl.-sn
7	o	o	10 : 10	10, sl.-sn : 10
8	o : w	o	10 : 10, sl.-sn	10, sl.-sn : 10 : 10
9	o	o : o : mN	10 : 10, sl.-f : v, cu.-s, th.-cl	v, cu.-s, cu, ci.-s, th.-cl : v
10	v : m, g.-cur	w : m	o, f : cu, ci, ci.-s, h.-fr, mt	3,ci,ci.-cu,th.-cl : 1, ci, ci.-cu : o, mt
11	m : m, g.-cur	m : m	o, mt : 10, f	10, f : v, h.-fr, f
12	m : w	w : o : o	f, h.-fr : f, h.-fr : mt, ci.-cu	6, th.-cl, cu, ci : 1, f
13	o	o	h.-fr : 6, ci.-cu, cu.-s	9, so.-ha : 10, sn
14	o	o	v : 3, ci.-cu, ci.-s, ci	ci.-cu, ci.-s, cu.-s : 10, r, w
15	o	o	10, r, w : 10, sl.-r, w	8, ci, ci.-cu, sl.-r : vv, ci.-cu
16	o : g.-cur, N	w : o : o	v : v, w : 10, r	9, cu.-s, sc : 9, sl.-r : 10
17	o	o	10, v : 10, sl.-r, w	10, oc.-r : 10, sl.-r
18	o	wN : w	v : vv, cu.-s, ci.-cu, cu, ci, w	10, r, w : vv, fr.-h.-shs, w
19	o	w : o	vv, w : vv, ci, ci.-s, ci.-cu, so.-ha, w	v,cu,cu.-s,ci.-cu,ci.-s,w : 10, oc.-th.-r
20	o : o : w	o	10 : 10, r	10, r : 10, oc.-th.-r
21	o	o	10, r : 10, w	10, sl.-r, st.-w : 10, oc.-th.-r, st.-w
22		o	v : vv, ci.-cu, cu.-s, w	7,ci.-cu,cu,cu.-s,sl.-r,st.-w : o, w
23	o	wN : o	v : 9, w	10, r, w : 10, th.-r, w : o
24	o : w	o	o : 4, cu.-s, cu, ci.-cu	5,cu,cu.-s,ci,w : 10 : v
25	o : w	wN, g.-cur : o : o	v : 10, r	10, ci.-cu, cu.-s, sl.-r : 10, r
26	o	o	v : v, ci.-cu	10, oc.-th.-r : vv, th.-cl, w
27	o : o : w	o	vv : 10, r	10, r : v : v, m
28	o	o	v : 10	vv : 10, l.-r
29	o	o	10 : 10, sc, sl.-r	v,ci,ci.-cu,ci.-s : o, lu.-co, h.-d : v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 36°·5, being 1°·8 *higher* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot216$, being $0^{in}\cdot010$ *greater* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot5$, being $0^{gr}\cdot1$ *greater* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 84 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 548 grains, being 5 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·5.

WIND.

The proportions were of N. 5, S. 8, W. 13, E. 3, and Calm 0. The greatest pressure in the month was $24^{lbs}\cdot7$ on the square foot on the 21st. The mean daily horizontal movement of the air for the month was 375 miles; the greatest, 655 miles on the 23rd; and the least, 49 miles on the 11th.

RAIN.

Fell on 19 days in the month, amounting to $1^{in}\cdot50$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot02$ *less* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer, with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Mar. 1	..	29·404	49·8	42·0	45·4	43·6	60·8	38·0	46·3	44·9	1·8	4·4	0·0	+ 5·1	SSW : S : SW	SW	2·6	0·0	0·3	323	0·40
2	..	29·647	51·4	39·3	44·5	39·5	91·1	34·5	46·7	45·3	5·0	9·8	2·2	+ 4·1	SW	SW : SSW : W	2·8	0·0	0·3	363	0·05
3	First Qr.	29·540	56·2	46·0	50·7	46·2	70·3	42·7	47·1	45·5	4·5	7·0	3·1	+10·2	SW : WSW	SW : WSW	13·5	0·0	2·4	646	0·01
4	Greatest Declination N.	29·556	50·9	37·7	43·3	34·5	103·0	32·2	48·1	46·5	8·8	13·4	4·8	+ 2·8	WSW	W : WSW	7·7	0·0	1·7	570	0·00
5	Perigee	29·536	50·4	35·7	44·1	43·0	69·6	32·0	47·5	46·1	1·1	4·6	0·0	+ 3·6	WSW : SW : SSW	W : WSW	3·0	0·0	0·4	372	0·10
6	..	29·497	55·0	41·5	46·5	38·6	96·8	36·0	47·5	46·3	7·9	14·0	2·5	+ 6·0	W : WSW	W : WSW	23·0	0·2	2·6	743	0·01
7	..	29·629	48·2	36·6	41·5	31·7	101·4	32·0	47·5	45·7	9·8	15·8	3·1	+ 1·0	WSW : W : WNW	WNW : W : WSW	19·1	0·1	1·5	644	0·00
8	..	29·271	51·9	37·7	44·5	41·6	82·0	31·8	46·5	45·3	2·9	10·7	0·0	+ 4·0	WSW : SW	WSW : SW	17·6	0·2	1·4	605	0·07
9	..	28·623	49·0	34·8	38·7	30·1	106·5	30·3	47·1	45·7	8·6	15·2	1·3	− 1·8	WSW : W	WSW : SW	27·5	0·1	1·8	672	0·05
10	Full: In Equator.	28·569	46·4	33·8	38·9	36·5	91·0	30·0	46·7	45·1	2·4	6·5	0·0	− 1·7	WSW : SW	SW : W : WSW	16·5	0·0	0·6	484	0·23
11	..	28·973	50·2	36·8	42·5	34·2	99·0	30·3	45·3	43·5	8·3	14·3	3·6	+ 1·8	WSW : W	W : WNW : WSW	11·5	0·0	1·1	536	0·00
12	..	28·611	46·6	31·5	36·2	34·9	52·5	31·0	44·7	42·7	1·3	3·8	0·0	− 4·6	SE : E	SW : N : WSW	25·0	0·0	1·3	401	0·68
13	..	29·469	45·0	28·7	36·7	31·5	92·3	24·3	43·5	41·5	5·2	14·7	0·0	− 4·3	WNW : W	W : WSW	4·1	0·0	0·5	364	0·03
14	..	29·400	54·2	41·5	47·3	40·2	91·3	36·9	42·5	39·9	7·1	14·4	3·3	+ 6·1	WSW	W : WSW	22·5	0·3	3·5	797	0·01
15	..	29·129	50·4	36·4	41·9	34·9	98·6	31·5	42·3	40·5	7·0	14·5	0·5	+ 0·5	WSW : W	W	35·0	0·1	4·0	869	0·11
16	..	29·475	49·0	33·7	40·2	32·3	109·4	29·0	43·3	41·7	7·9	15·7	0·6	− 1·3	WSW : W	WNW : W	4·2	0·0	1·2	535	0·00
17	Apogee	29·542	44·2	29·8	35·8	26·4	96·7	25·0	43·5	41·8	9·4	16·9	5·9	− 5·8	W	NW : WNW	6·4	0·0	1·2	565	0·00
18	Last Quarter: Greatest Dec. S.	29·800	42·9	29·3	34·9	23·8	91·5	20·2	43·3	41·5	11·1	14·3	5·3	− 6·8	WNW : NNW	N	8·2	0·0	1·2	405	0·00
19	..	29·798	37·0	25·5	31·2	24·0	75·2	18·3	42·3	40·5	7·2	10·1	1·9	−10·5	N : WSW : NNW : NNE	NNE : N : NNW	1·3	0·0	0·1	280	0·06
20	..	29·854	41·9	27·9	33·7	27·6	99·4	23·7	40·8	38·7	6·1	13·0	2·8	− 8·0	NNW : N	N : NNW	2·6	0·0	0·3	263	0·00
21	..	29·703	39·0	26·2	32·1	27·4	52·8	20·0	39·3	37·3	4·7	11·0	0·6	− 9·7	SW : SE	SE : ESE : ENE	0·0	0·0	0·0	143	0·01
22	..	29·717	43·4	26·3	33·6	29·4	106·0	26·3	38·7	36·9	4·2	11·5	0·0	− 8·3	NE	NE : NNE : N	2·8	0·0	0·1	298	0·12
23	..	29·699	46·4	25·8	36·4	31·0	87·7	19·8	38·5	36·7	5·4	13·2	0·0	− 5·6	NNW : N	W : NW : SW	0·0	0·0	0·0	141	0·00
24	..	29·483	52·0	28·5	40·7	33·2	111·0	24·2	38·5	36·5	7·5	18·5	0·0	− 1·4	SW : SSW	S : SE : ENE	0·2	0·0	0·0	201	0·00
25	In Equator New.	29·508	51·9	35·0	42·2	36·7	114·5	31·6	40·1	37·9	5·5	12·0	1·3	− 0·1	ENE	ENE	3·9	0·0	0·5	428	0·00
26	..	29·407	40·0	34·8	36·3	29·5	59·0	34·7	40·8	38·8	6·8	8·7	4·2	− 6·2	ENE	ENE : ESE	2·3	0·0	0·2	321	0·00
27	..	29·215	44·3	33·7	38·7	37·6	60·0	33·7	41·1	39·1	1·1	4·8	0·0	− 4·0	ESE : E	E : ENE	1·5	0·0	0·1	262	0·22
28	..	29·037	57·0	42·5	49·2	45·5	86·1	41·0	41·8	39·3	3·7	9·1	0·0	+ 6·2	SE : S	S : SSE : SSW	0·7	0·0	0·1	239	0·14
29	..	29·187	55·6	41·2	46·2	40·6	107·0	37·4	42·1	40·3	5·6	11·9	0·9	+ 2·9	SSW	SSW	2·4	0·0	0·2	302	0·00
30	Perigee	29·449	55·7	40·8	47·3	39·8	113·4	35·5	43·7	41·5	7·5	13·7	3·2	+ 3·6	SW : SSW	S : SE : ESE	0·4	0·0	0·0	281	0·00
31	Greatest Declination N	29·387	64·7	44·2	53·2	40·2	129·7	38·5	43·3	41·3	13·0	22·0	3·1	+ 9·2	SSE	S : SW	1·7	0·0	0·1	261	0·02
Means	..	29·391	49·1	35·0	41·1	35·0	90·5	30·7	43·6	41·8	6·1	11·9	1·7	− 0·4	...	...	..	..	..	Sum 13314	Sum 2·32

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·674 on the 2nd; the first minimum in the month was 29in·366 on the 1st.
The second maximum ,, was 29in·637 on the 4th; the second minimum ,, was 29in·510 on the 3rd.
The third maximum ,, was 29in·719 on the 7th; the third minimum ,, was 29in·430 on the 6th.
The fourth maximum ,, was 29in·091 on the 11th; the fourth minimum ,, was 28in·518 on the 9th.
The fifth maximum ,, was 29in·508 on the 13th; the absolute minimum ,, was 28in·316 on the 12th.
The sixth maximum ,, was 29in·821 on the 18th; the sixth minimum ,, was 29in·077 on the 15th.
The absolute maximum ,, was 29in·903 on the 19th; the seventh minimum ,, was 29in·711 on the 19th.
The eighth maximum ,, was 29in·770 on the 23rd; the eighth minimum ,, was 29in·675 on the 21st.
The ninth maximum ,, was 29in·471 on the 30th; the ninth minimum ,, was 29in·027 on the 28th.
the tenth minimum ,, was 29in·385 on the 31st.
The range in the month was 1in·587.
The mean for the month was 29in·391, being 0in·366 *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 64°·7 on the 31st; the lowest was 25°·5 on the 19th.
The range ,, was 39°·2.
The mean ,, of all the highest daily readings was 49°·1, being 0°·8 *lower* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 35°·0, being 0°·2 *lower* than the average of the preceding 35 years.
The mean daily range was 14°·1, being 0°·6 *less* than the average of the preceding 35 years.
The mean for the month was 41°·1, being 0°·6 *lower* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
March 1	0	ss,sp,v,g.-cur : 0 : 0	v : 10, r	10, h.-r, gt.-glm: v : 0
2	0	0	v : v	v, cu.-s, ci.-cu : v, sl.-r : 10, r
3	0	0	10 : 9	10, w : vv, li.-cl, w
4	0	w : 0 : 0	v : v, ci, cu, ci.-cu	v, cu.-s, cu, ci.-cu, ci, w: 0
5	0	0	v : 10, th.-r	10, r : 10, r
6	0	0	v, w : v, sh.-r, hl, st.-w	vv, ci, ci.-cu, sh.-r, st.-w : v, li.-cl, lu.-ha
7	0	0	v : 5, ci.-cu, ci, w	v, ci.-cu, cu.-s, ci, st.-w: 0, li.-cl, lu.-ha
8	0	0	shs.-r : 5,ci.-s,ci.-cu,cu.-s,sl.-r,w	10, oc.-r, st.-w : v, mt, lu.-ha, w
9	0 : 0 : ss,v,sp,g.-cur	0	lu.-ha, w, r : v, ci, ci.-s, w	v,ci,ci.-cu,cu,sc,so.-ha,w,sn : 10, sl
10	0	0	10, r, sl : 10, r, sl, w	v, cu, ci.-cu, ci : v, ci.-cu, ci
11	0	0	v : v, ci.-cu, cu	7, cu.-s, ci.-cu, li.-shs, w: 10, lu.-ha
12	0	0	10 : 10, sl, r : 10, sn, r	10, sn, r, st.-w : v
13	0	0	v : v, sn, f, glm	4,ci.-cu,cu,so.-ha: 10, oc.-th.-r : 10, th.-r, w
14	0	0	10, sl.-r, w : 10, sl.-r : v,cu.-s,ci.-cu,w	vv,ci.-cu,cu,cu.-s,ci,st.-w: vv, st.-w, h.-g
15	0	0	vv, h.-g : 10, r, w	v,ci,ci.-cu,cu,st.-w: v, sh.-r, w : v
16	0	0	v : v, ci.-cu, cu, cu.-s	v, ci.-cu, cu.-s, sh.-r : v, ci.-cu, cu, cu.-s
17	0	0	v, ci.-cu, cu.-s : v : v,cu.-s,ci.-cu,sl.-sn	v, cu.-s, ci.-cu, sn, w : 0
18	0	0	0 : v, w : 4, ci.-cu, cu	vv, ci.-cu, cu : 0
19	0	0	v : 10, h.-sn : 10, sl.-sn	v, cu.-s, ci.-cu : 10
20	0	0	v : v, cu.-s, ci.-cu, ci	v, shs.-sn : 5, sl.-sn : 0
21	0 : 0 : w	0	v : 10, sl.-f	10 : 10, sn : 9
22	0 : 0 : w	ss,v,g.-cur,sp : 0 : 0	v, h.-sn : v, cu.-s, cu, ci	v, oc.-sn : 0 : 0
23	0	0	0, h.-fr : li.-cl, h, sl.-f	v, h : v, h, f
24	0 : 0 : w	w : w : mP,g.-cur,sp	f, h.-fr : f, h.-fr, li.-cl : 1, ci.-cu, li.-cl	1, ci.-cu, ci : 0 : th.-cl
25	w	w : 0	v : ci.-cu, ci.-s, sc	v,cu.-s,ci.-cu,cu : 8, cu.-s, ci.-cu : 10
26	0	w : 0	10 : 10	10 : 10
27	0 : 0 : w	0	10 : 10	10 : 10, r : 10, r
28	0 : 0 : w	w : 0 : 0	10, r : 10, r : 10, oc.-th.-r	9, cu.-s, ci.-cu : v, sl.-r : vv
29	0	0	v : 10, r	7, ci.-cu, cu, cu.-s: v, oc.-shs : vv
30	0	0 : 0 : w	v : v, ci.-cu, cu.-s	9, cu.-s, ci.-cu : vv, ci.-cu, l, lu.-co
31	0	w : 0 : 0	v : li.-cl, so.-ha	8, ci, ci.-s, so.-ha : 8, th.-cl, lu.-ha: v, ci.-cu, cu, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 35°·0, being 1°·3 *lower* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0in·204, being 0in·013 *less* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2grs·4, being 0gr·1 *less* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 79 (that of Saturation being represented by 100), being 3 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 544 grains, being 6 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·5.

WIND.

The proportions were of N. 5, S. 8, W. 15, E. 3, and Calm 0. The greatest pressure in the month was 35lbs·0 on the square foot on the 15th. The mean daily horizontal movement of the air for the month was 429 miles; the greatest, 869 miles on the 15th; and the least, 141 miles on the 23rd.

RAIN.

Fell on 18 days in the month, amounting to 2in·32, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·76 *greater* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	WIND AS DEDUCED FROM ANEMOMETERS. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles	in.
April 1	First Qr.	29·563	54·4	39·4	46·4	43·1	77·5	33·0	44·8	43·5	3·3	8·6	0·2	+ 2·2	WSW : NW : N : NNE	N	0·0	0·0	0·0	133	0·00
2	..	29·838	60·7	32·7	46·4	39·9	123·0	27·9	47·5	45·8	6·5	20·5	0·0	+ 1·9	N : NE	ENE : SE	1·1	0·0	0·0	139	0·00
3	..	30·086	61·1	32·8	46·8	40·4	118·9	27·6	48·9	46·9	6·4	18·8	0·0	+ 2·0	ESE	SE : SW	0·0	0·0	0·0	119	0·00
4	..	30·264	67·8	37·7	52·3	48·0	127·5	29·0	49·1	46·9	4·3	16·2	0·0	+ 7·3	WSW	WSW : WNW : SW	0·2	0·0	0·0	232	0·00
5	..	30·291	60·4	47·6	53·3	49·5	81·0	41·7	50·3	48·1	3·8	9·3	0·2	+ 8·1	WSW	WNW	0·0	0·0	0·0	147	0·00
6	..	30·234	62·4	49·0	54·0	49·2	93·0	43·0	51·3	48·8	4·8	11·0	0·0	+ 8·7	NE	ESE : ENE	0·7	0·0	0·0	213	0·00
7	In Equator	30·159	61·8	41·6	50·0	37·5	129·0	37·0	52·3	49·3	12·5	27·0	1·0	+ 4·6	E	E	2·1	0·0	0·1	284	0·00
8	Full	29·829	70·2	39·0	54·7	39·7	136·2	33·2	53·1	50·3	15·0	29·9	0·0	+ 9·2	E : SE	S : SSW : SW : WSW	1·8	0·0	0·1	246	0·00
9	..	29·674	62·1	45·2	51·8	43·7	108·5	41·3	53·8	51·1	8·1	15·4	4·0	+ 6·2	WSW	WSW : SW	6·2	0·0	1·2	592	0·00
10	..	29·211	52·6	37·0	45·0	44·6	68·0	34·5	54·3	51·3	0·4	5·2	0·0	− 0·7	SW : SSW	SSW : WSW : WNW	13·5	0·0	1·6	688	0·27
11	..	29·509	50·3	32·0	39·3	29·9	106·5	28·5	54·1	50·8	9·4	17·4	2·2	− 6·5	WSW	W : NW : WSW	6·0	0·0	1·0	606	0·00
12	..	29·721	46·1	29·2	34·6	27·5	88·6	25·8	52·8	49·5	7·1	15·0	3·3	− 11·3	WSW : WNW	NW : WNW : SW	3·2	0·0	0·2	293	0·00
13	..	29·339	44·1	29·9	34·2	32·4	87·5	25·1	51·3	48·1	1·8	7·3	0·0	− 11·8	SSW : SW : WSW	W : NW : N	7·0	0·0	1·0	445	0·18
14	Greatest Dec. S. Apogee.	29·702	47·0	31·8	37·2	33·0	85·0	31·8	49·3	46·5	4·2	9·0	1·3	− 9·0	NNE : NE	ENE : NE	4·6	0·0	1·0	489	0·24
15	..	30·083	54·8	34·0	44·1	32·9	121·0	28·0	47·5	44·9	11·2	21·0	1·7	− 2·3	NE : ENE	E : ENE	5·3	0·0	0·5	358	0·00
16	Last Qr.	29·873	55·4	33·5	45·0	33·8	112·2	28·0	46·3	43·3	11·2	20·4	0·5	− 1·6	ENE	ENE : NE	9·5	0·0	0·6	408	0·00
17	..	29·378	50·0	40·5	43·6	40·5	68·0	35·7	46·1	42·9	3·1	6·9	0·0	− 3·2	NNE : NE	SSW : S : SE	0·0	0·0	0·0	138	0·02
18	..	28·971	59·6	39·4	47·3	42·6	110·0	34·7	45·5	44·3	4·7	15·4	1·6	+ 0·3	SSE	S : SSE	1·2	0·0	0·1	253	0·00
19	..	28·792	56·5	42·5	47·1	42·7	105·6	39·0	47·1	44·9	4·4	9·9	0·4	− 0·1	SSE : SSW	SSW : SW	3·1	0·0	0·4	333	0·16
20	..	29·158	58·7	44·0	49·0	42·7	109·7	40·2	48·1	45·5	6·3	12·9	1·5	+ 1·6	SSW	SSW	6·2	0·0	1·0	480	0·02
21	In Equator	29·432	58·0	44·1	49·5	44·7	99·0	39·9	49·3	46·5	4·8	10·1	1·8	+ 1·9	SSW	SSW : SW	2·6	0·0	0·3	384	0·00
22	..	29·717	62·4	43·5	50·8	44·3	105·5	35·8	50·3	47·5	6·5	14·8	0·4	+ 3·0	WSW	NW : NE : SE	0·0	0·0	0·0	180	0·00
23	..	29·825	62·4	43·5	49·6	41·1	127·8	37·0	51·3	48·3	8·5	15·6	0·2	+ 1·6	ESE : SSW	SSW : S	0·5	0·0	0·0	203	0·00
24	New	29·866	66·0	44·3	53·7	44·3	132·5	37·2	52·8	49·1	9·4	19·0	3·6	+ 5·5	SSE : SSW	SSW : S	1·9	0·0	0·1	256	0·00
25	..	29·933	61·8	43·5	51·0	39·9	121·6	36·5	53·5	50·3	11·1	17·7	2·1	+ 2·7	SW : WSW	W : WSW	4·0	0·0	0·9	527	0·00
26	Perigee	29·974	63·0	39·3	50·5	39·4	121·9	33·2	54·3	51·3	11·1	21·9	1·4	+ 2·1	WSW : W	W : WNW : WSW	0·6	0·0	0·0	282	0·00
27	..	29·725	55·4	46·1	49·5	45·3	66·1	42·4	54·6	51·6	4·2	8·0	2·5	+ 0·9	SW : SSW	SSW : SE	0·5	0·0	0·0	219	0·11
28	Greatest Declination N.	29·334	60·5	42·5	48·2	41·6	126·0	37·5	55·3	52·1	6·6	14·4	2·0	− 0·6	S : SSW : WSW	WSW : SW	3·6	0·0	0·2	330	0·10
29	..	29·377	59·7	41·5	49·4	42·4	97·2	36·1	55·3	52·3	7·0	13·5	1·3	+ 0·3	SSW : S	SSW : SSE	1·2	0·0	0·0	211	0·00
30	First Qr.	29·538	47·2	40·0	42·3	39·8	54·1	38·4	55·3	52·8	2·5	4·4	0·9	− 7·1	ENE : NE	NE : NNE	1·8	0·0	0·2	351	0·17
Means	..	29·680	57·7	39·6	47·2	40·5	103·6	34·6	50·8	48·2	6·7	14·5	1·1	+ 0·5	...	...	..	..	..	Sum 9539	Sum 1·27

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute maximum in the month was $30^{in}\cdot326$ on the 5th; the first minimum in the month was $29^{in}\cdot108$ on the 10th.
The second maximum ,, was $29^{in}\cdot788$ on the 12th; the second minimum ,, was $29^{in}\cdot312$ on the 13th.
The third maximum ,, was $30^{in}\cdot101$ on the 15th; the absolute minimum ,, was $28^{in}\cdot748$ on the 19th.
The fourth maximum ,, was $30^{in}\cdot021$ on the 26th; the fourth minimum ,, was $29^{in}\cdot325$ on the 28th.
The range in the month was $1^{in}\cdot578$.
The mean for the month was $29^{in}\cdot680$, being $0^{in}\cdot091$ *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was $70^{\circ}\cdot2$ on the 8th; the lowest was $29^{\circ}\cdot2$ on the 12th.
The range ,, was $41^{\circ}\cdot0$.
The mean ,, of all the highest daily readings was $57^{\circ}\cdot7$, being $0^{\circ}\cdot2$ *lower* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was $39^{\circ}\cdot6$, being $0^{\circ}\cdot4$ *higher* than the average of the preceding 35 years.
The mean daily range was $18^{\circ}\cdot1$, being $0^{\circ}\cdot6$ *less* than the average of the preceding 35 years.
The mean for the month was $47^{\circ}\cdot2$, being *the same as* the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
April 1	o	w : o : o	v : 10, mt	10, mt : 10
2	o : o : w	o : o : w	v : 3, li.-cl, h, mt	1, ci.-cu : o : o
3	m	w : o : w	o : o, f, h	o, sl.-h : o : o
4	w : w : m.g.-cur	w :w:s.g.-cur,sp,N	o : v, li.-cl	8, ci, ci.-s : v, ci.-cu, ci.-s : o
5	m	w : o : o	v : 10. mt	10 : 10 : v, mt, lu.-co
6	o	w	v : 10	9, cu.-s, ci.-cu, sl.-r : 10
7	w : m	w : o :s,g.-cur,sp	10 : 10 : 1, ci, ci.-cu	o : o
8	w	o : w : w	o : o	o : o
9	w	o : w	v : vv	v, ci.-cu, cu.-s, shs -r, w : v, sl.-r, w
10	w	o	v : 10, sh.-r : 10, r, st.-w	10, r, st.-w : 10, r : v, w
11	o	w : w	v : v, cu.-s, cu, w	v, cu.-s. cu, w : v, sh.-r : v
12	o : o : s,N.g.-cur	s,v,g.-cur,sp :o : o	v : v, li.-cl, h, sn	10, sn, l, t : v, sh.-sn : o, sl.-f
13	o	o	v : v, r, sl	10, r : 10, r, sl, sn
14	o	w : o : o	10, r, sl, sn : 10, r, sl, sn : v, r, sl, sn	7 : o : v
15	o	o	o : o	o : o, m
16	o : w	w	o, m : o : 1, ci.-s, w	v, ci.-cu, ci : 10 : 10
17	w : o	w : m, g.-cur	10, sl.-r : 10	10 : v, cu.-s
18	w : mN,g.-cur	w : o	v : 10, sl.-r	v, cu.-s, ci.-cu, oc.-shs : v, cu.-s, ci.-cu, oc.-shs,m
19	o	o	v, cu.-s, ci.-cu : v, oc.-h.-shs	9, cu.-s, cu, oc.-th.-r, w : v, ci.-cu, fr.-shs
20	o	o	v, shs : v, cu.-s, ci.-cu, fr.-shs	v, oc.-shs : v, ci.-cu, cu.-s : vv, ci.-cu, cu.-s
21	o	o	vv : v, cu.-s, cu, oc.-th.-r	v,cu.-s,ci.-s,ci.-cu,th.-r : v
22	o : o : m	o : o : w	v : 6, h, th.-cl	8, h : 4, h : 4, h
23	o	o : w	v : 10, ci.-cu, cu.-s	v, ci.-cu, cu.-s : o : 1, ci.-cu
24	o	o	v, ci.-cu : v, ci.-cu, cu	v. cu, ci : 10, sl.-r
25	o	w : o : o	10 : v, ci.-cu, ci, sh.-r	5, ci.-cu, cu : o, m
26	o	o	v : 4, ci, ci.-cu	6, ci.-cu, cu, cu.-s : v, ci, ci.-cu, cu.-s, m
27	o	o	v : 10, sl.-r	10, oc.-th.-r : v, h.-r
28	o	ss,v,sp,g.-cur : o	10 : v, oc.-shs	vv, t.-s, r, hl : v, sl.-r : v
29	o	o	v : v, cu.-s, ci.-cu, ci, r	v, ci.-cu, cu.-s, ci : v, ci.-cu
30	o	o	v : 10, r	10, r : 10, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 40°·5, being 0°·3 *lower* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0^{in}·252, being 0^{in}·004 *less* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2^{grs}·9, being *the same as* the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 78 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 542 grains, being 2 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·2.

WIND.

The proportions were of N. 5, S. 10, W. 9, E. 6, and Calm 0. The greatest pressure in the month was 13^{lbs}·5 on the square foot on the 10th. The mean daily horizontal movement of the air for the month was 318 miles; the greatest, 688 miles on the 10th; and the least, 119 miles on the 3rd.

RAIN.

Fell on 9 days in the month, amounting to 1^{in}·27, as measured in the simple cylinder gauge partly sunk below the ground; being 0^{in}·41 *less* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	Osler's. General Direction. P.M.	Osler's. Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
May 1	..	29·825	53·5	36·3	43·6	36·2	114·5	34·7	53·1	52·5	7·4	15·6	2·5	− 6·2	NNE	NNE	2·6	0·0	0·2	308	0·00
2	..	29·990	53·0	32·6	41·2	32·6	112·8	28·2	53·9	51·3	8·6	16·4	1·9	− 8·9	N	N : NNE	2·5	0·0	0·3	291	0·00
3	..	30·161	57·0	31·5	44·3	34·4	128·2	27·7	53·1	50·3	9·9	19·4	0·7	− 6·1	N : NNE	NE : ESE	0·6	0·0	0·0	208	0·00
4	In Equator	30·289	58·0	31·7	45·3	35·4	130·2	(28·0)	52·5	50·1	9·9	17·7	0·7	− 5·4	E : ESE	E : ESE	0·3	0·0	0·0	117	0·00
5	..	30·167	60·5	31·5	47·0	35·7	127·6	28·6	52·8	50·3	11·3	20·9	0·0	− 4·0	E : SE	ESE : SE : SSE	0·5	0·0	0·0	140	0·00
6	..	30·039	68·1	33·1	50·2	37·2	124·8	27·0	53·3	50·5	13·0	25·9	0·6	− 1·0	E : ENE	N : ESE : ENE	0·7	0·0	0·0	170	0·00
7	..	30·162	59·3	38·7	47·8	41·5	136·4	35·0	52·3	49·3	6·3	14·4	0·9	− 3·5	NE : E	E : NE	3·0	0·0	0·5	354	0·00
8	Full	30·213	57·6	37·5	47·7	36·8	129·8	34·2	53·9	51·1	10·9	18·6	1·0	− 3·7	NE : E	E : ENE : NE	8·5	0·0	0·8	471	0·00
9	..	30·135	57·1	39·1	47·0	35·9	126·0	36·2	54·1	51·3	11·1	20·0	3·7	− 4·5	NE : ENE	ENE : NE	12·3	0·0	1·1	535	0·00
10	..	30·057	58·4	37·8	47·3	35·9	127·6	34·0	54·3	51·3	11·4	20·3	6·5	− 4·2	NE : ENE	E : ENE	5·0	0·0	0·9	420	0·00
11	Greatest Declination S.	29·955	63·0	38·0	49·7	34·6	128·2	29·9	54·3	50·9	15·1	23·2	2·2	− 1·9	NE : ENE : E	E : ENE : NE	3·5	0·0	0·4	342	0·00
12	Apogee	30·007	56·5	37·8	45·1	34·7	121·3	31·4	54·5	51·3	10·4	18·6	1·7	− 6·6	NE : ENE	ENE : NE : NNE	3·2	0·0	0·3	343	0·00
13	..	30·061	59·0	33·3	45·1	33·7	138·1	20·3	54·3	51·3	11·4	23·2	2·9	− 6·7	N : NNE : NE	NE : ENE : NNE	1·9	0·0	0·2	295	0·00
14	..	29·909	58·2	32·4	45·7	37·7	113·7	25·3	54·1	51·3	8·0	17·5	2·6	− 6·3	WSW : N	NNE	0·0	0·0	0·0	175	0·00
15	..	29·904	59·4	38·8	47·5	40·2	125·0	33·0	54·1	51·3	7·3	16·2	3·1	− 4·9	N : NE	ESE : E	1·1	0·0	0·0	229	0·00
16	Last Qr.	29·983	62·0	38·4	49·2	41·4	125·0	30·8	53·7	50·5	7·8	17·7	2·1	− 3·6	NE : ENE	E : ESE : ENE	2·5	0·0	0·2	284	0·00
17	..	29·998	62·0	39·9	50·4	41·1	119·1	36·2	54·3	51·7	9·3	19·0	2·5	− 2·8	NE : ENE	ENE	5·2	0·0	0·4	374	0·00
18	..	30·041	61·9	40·3	48·2	38·8	134·8	35·9	53·8	51·3	9·4	18·6	2·8	− 5·3	ENE : NE	NE : NNE	2·3	0·0	0·3	381	0·00
19	In Equator	30·103	66·2	39·5	51·0	40·6	134·2	32·5	54·3	51·8	10·4	22·0	5·5	− 2·6	NE : ENE	ENE : NE	2·4	0·0	0·5	351	0·00
20	..	30·061	69·0	33·5	52·4	37·4	137·0	27·4	54·3	52·1	15·0	27·0	0·6	− 1·3	N : NNE	N : SW	0·1	0·0	0·0	139	0·00
21	..	29·894	73·6	38·5	56·7	43·4	126·9	31·0	54·3	52·1	13·3	24·0	0·5	+ 2·8	Variable	SW : SSW	1·5	0·0	0·1	200	0·00
22	..	29·622	66·5	43·4	52·7	46·1	124·5	34·0	55·3	52·3	6·6	19·4	0·4	− 1·4	SSW : WSW	SW : WSW	4·7	0·0	0·7	403	0·51
23	New	29·602	63·0	44·5	51·8	45·9	114·0	40·5	55·3	53·8	5·9	9·7	2·9	− 2·5	WSW	WSW	2·8	0·0	0·4	405	0·01
24	Perigee	29·524	55·2	42·3	47·6	44·3	69·5	38·2	56·3	53·8	3·3	10·2	0·8	− 7·0	SW : SSW : WSW	ENE : NNE	0·0	0·0	0·0	152	0·43
25	Greatest Declination N.	29·630	56·2	44·7	47·5	42·3	90·6	44·2	56·3	54·1	5·2	13·1	0·0	− 7·5	N	N : NNW	2·2	0·0	0·2	246	0·10
26	..	29·624	53·5	42·3	47·7	47·6	66·3	37·5	56·5	53·8	0·1	4·2	0·0	− 7·5	NNW : WNW : WSW	W : WNW	0·8	0·0	0·0	232	0·08
27	..	29·756	64·0	49·4	54·0	50·3	86·0	43·0	56·3	53·9	3·7	11·3	1·0	− 1·3	WNW : NW	N	0·7	0·0	0·0	209	0·00
28	..	30·027	67·0	47·0	54·2	49·5	109·8	41·0	56·3	54·0	4·7	15·3	0·0	− 1·3	W : NW	NW : W : N	0·1	0·0	0·0	199	0·00
29	..	30·023	70·8	47·7	57·7	48·5	125·8	44·5	55·8	54·1	9·2	17·6	1·3	+ 2·0	N : NW : W	W : NW : SSW : SW	0·1	0·0	0·0	178	0·00
30	First Qr.	29·921	73·6	44·7	59·2	48·0	135·4	39·1	56·3	54·1	11·2	20·4	0·9	+ 3·2	SW : W	WSW : W	0·7	0·0	0·0	276	0·00
31	In Equator	29·955	66·3	47·7	56·4	46·6	114·2	42·5	57·3	54·3	9·8	18·5	2·1	+ 0·1	WSW : W : NW : N	N : NE : E : SE	1·7	0·0	0·1	237	0·00
Means	..	29·956	61·6	39·2	49·4	40·5	119·3	34·2	54·6	52·0	8·9	17·9	1·8	− 3·5	...	...	..	..	..	Sum 8664	Sum 1·13

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute maximum in the month was $30^{in}\cdot317$ on the 4th; the first minimum in the month was $29^{in}\cdot991$ on the 6th.
The second maximum ,, was $30^{in}\cdot240$ on the 8th; the second minimum ,, was $29^{in}\cdot932$ on the 11th.
The third maximum ,, was $30^{in}\cdot067$ on the 13th; the third minimum ,, was $29^{in}\cdot874$ on the 14th.
The fourth maximum ,, was $30^{in}\cdot131$ on the 19th; the absolute minimum ,, was $29^{in}\cdot496$ on the 24th.
The fifth maximum ,, was $30^{in}\cdot057$ on the 29th; the fifth minimum ,, was $29^{in}\cdot884$ on the 30th.
The range in the month was $0^{in}\cdot821$.
The mean for the month was $29^{in}\cdot956$, being $0^{in}\cdot172$ *higher* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was $73^{\circ}\cdot6$ on the 21st and 30th; the lowest was $31^{\circ}\cdot5$ on the 3rd and 5th.
The range ,, was $42^{\circ}\cdot1$.
The mean ,, of all the highest daily readings was $61^{\circ}\cdot6$, being $2^{\circ}\cdot9$ *lower* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was $39^{\circ}\cdot2$, being $4^{\circ}\cdot8$ *lower* than the average of the preceding 35 years.
The mean daily range was $22^{\circ}\cdot4$, being $1^{\circ}\cdot9$ *greater* than the average of the preceding 35 years.
The mean for the month was $49^{\circ}\cdot4$, being $3^{\circ}\cdot5$ *lower* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
May 1	0	0	10 : 8, cu, cu.-s, ci, sl.-r, t	v, cu. s, ci.-cu, r : v, ci.-cu
2	0 : 0 : ss.g.-cur.sp	0	v : 6, cu.-s, cu, ci.-s, sl.-r	v, ci.-cu, cu : v, cu.-s, ci.-cu
3	0	0	v : 4, cu, ci.-s, ci	5, ci.-cu, cu, cu.-s : 0
4	0	0	0 : 1, ci	0 : 1, ci.-cu : 0
5	0 : 0 : w	0	v : 4, ci.-cu, ci	2, ci.-cu, ci : 0 : v
6	0 : 0 : w	w : w : m,g.-cur	0 : 1, ci.-cu, ci.-s	4, ci,ci.-cu,cu.-s : 0 : 0
7	w	0 : w	v : 9, cu.-s, ci, th.-r	v, cu.-s, cu, ci : 0 : 0
8	0	0	v : 4, cu, ci.-cu, ci	2,cu,ci.-cu,ci,w : 0 : 0
9	0	0	0 : 2, ci.-cu, ci, w	0 : 0 : ci
10	0	0	v : v, cu, cu.-s, ci	1, cu, ci.-cu : 2, cu.-s, ci.-s
11	0	0	cu, ci.-cu : 1, ci.-cu, ci, cu	1, cu.-s, cu, ci : 0
12	0	0	v : 10	v, ci.-cu,ci,cu : v, cu.-s, cu, ci : 0
13			v : 8, cu.-s, ci.-cu	v, cu.-s, ci, sl.-r : 0
14			v : 10	10 : 10, oc.-sl.-r : 10
15			10 : 10, sl.-r	v, cu, ci.-cu, ci : v, cu, ci
16			v : v, ci.-cu, cu.-s	4, cu.-s, cu, ci : 3, cu, ci.-s
17			v : v, cu.-s, cu, ci.-cu	v, cu.-s, cu, ci : 0
18			v : 9, ci.-cu, cu.-s	6, cu.-s, ci.-cu : 3, cu.-s, s : 3, s, cu.-s
19			v : v, ci.-cu, ci	ci : ci
20			0 : 1, ci.-s	0 : 4, th.-cl : 10,th.-cl,sl.-f,mt
21	0	0	sl.-f, mt, li.-cl : 6, li.-cl, h	5, li.-cl, h : 6, li.-cl : 8, li.-cl
22	0	w : m,g.-cur	9 : 10 : v, cu.-s	9, th.-r : v, h.-r : v, cu.-s, r
23	0	s.g.-cur : 0 : 0	v : 9, cu.-s, cu, ci, r	9, fr.-r : v, cu.-s, ci
24	0	0	v : 10, r	10, r : 10, r : 10, r
25	0	0	10, r : 10 : 10, th.-r	v, cu.-s, cu : 9, fr.-th.-r
26	0	0	10 : 10 : 10, r	10, r : 10, sl.-f
27	0	0	10 : 10	10 : 10, oc.-th.-r
28	0	0	10 : 10	9, cu.-s, ci : v, ci.-cu, cu.-s
29	0	0	v : v, cu.-s, cu, ci.-cu	v, ci.-cu, ci : v, ci.-cu, ci : 0
30	0	0	0 : 0	0 : 0 1, li.-cl, lu.-co
31	0	0	v : v, cu, cu.-s, ci.-cu	v, cu.-s, cu, ci : v, cu.-s, ci

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 40°·5 being 5°·0 *lower* than the average of the preceding 35 years.
Elastic Force of Vapour.—The mean for the month was 0in·252, being 0in·055 *less* than the average of the preceding 35 years.
Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2grs·9, being 0gr·6 *less* than the average of the preceding 35 years.
Degree of Humidity.—The mean for the month was 71 (that of Saturation being represented by 100), being 5 *less* than the average of the preceding 35 years.
Weight of a Cubic Foot of Air.—The mean for the month was 545 grains, being 8 grains *greater* than the average of the preceding 35 years.

CLOUDS.
The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 5·2.

WIND.
The proportions were of N. 12, S. 3, W. 5, E. 11, and Calm 0. The greatest pressure in the month was 12lbs·3 on the square foot on the 9th. The mean daily horizontal movement of the air for the month was 279 miles; the greatest, 535 miles on the 9th; and the least, 117 miles on the 4th.

RAIN.
Fell on 5 days in the month, amounting to 1in·13, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·96 *less* than the average fall of the preceding 61 years.

ELECTRICITY.
From May 13 to 20, the electrical apparatus was under examination.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo placed on the Grass	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	Osler's. General Direction. P.M.	Osler's. Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles	in.
June 1	..	30·059	70·0	41·7	54·7	44·3	119·5	36·2	59·1	56·1	10·4	19·4	0·0	− 1·8	SE	ENE : SE : S : SW	0·0	0·0	0·0	119	0·00
2	..	29·857	70·2	42·5	54·3	48·6	121·3	36·6	60·3	56·5	5·7	15·8	0·2	− 2·4	SW : ENE	E : ESE	0·2	0·0	0·0	163	0·05
3	..	29·643	69·4	47·5	55·5	49·8	134·2	47·0	60·3	56·6	5·7	16·7	0·0	− 1·4	SSE : SSW	SW	3·8	0·0	0·4	321	0·07
4	..	29·800	68·0	46·5	54·1	44·2	127·7	41·7	60·7	57·3	9·9	20·0	2·5	− 3·0	WNW : W : WSW	WSW : SW : SSW	1·1	0·0	0·1	338	0·00
5	..	29·742	63·0	48·3	54·6	54·4	73·2	43·3	61·3	57·8	0·2	6·7	0·0	− 2·7	SSW : SW	SW	3·5	0·0	0·7	385	0·02
6	..	29·843	68·5	51·8	57·0	50·7	98·8	49·6	61·3	57·8	6·3	17·6	1·8	− 0·5	SW	WSW : SW	0·0	0·0	0·0	216	0·01
7	Full	29·821	70·0	50·5	57·7	45·4	124·7	50·0	61·3	58·1	12·3	22·8	1·2	+ 0·1	SW : W	W : WSW	0·7	0·0	0·1	275	0·00
8	Greatest dec. S. Apogee	29·699	67·0	43·8	54·4	46·9	122·6	37·0	61·1	57·3	7·5	15·3	0·0	− 3·3	SW	SSW : NNE	0·0	0·0	0·0	148	0·00
9	..	29·602	62·2	49·0	53·3	48·1	95·0	48·0	61·3	59·1	5·2	11·2	1·5	− 4·6	NE	ENE : NNE	0·0	0·0	0·0	189	0·06
10	..	29·990	62·9	43·0	50·5	42·4	115·6	36·0	60·8	58·5	8·1	20·0	0·0	− 7·6	NNE	N : NNE	3·6	0·0	0·7	387	0·00
11	..	29·952	72·5	40·1	55·8	43·4	135·0	32·1	60·3	58·1	12·4	23·6	0·0	− 2·5	N : NNE	NNE : SE	0·7	0·0	0·0	184	0·00
12	..	29·850	79·2	43·5	62·2	51·0	124·0	38·2	60·3	57·7	11·2	23·3	0·4	+ 3·7	WSW : N	N : NW	0·0	0·0	0·0	108	0·00
13	..	29·850	63·0	53·0	56·8	50·6	68·4	49·0	61·3	58·3	6·2	11·0	0·6	− 1·9	N : NNE	Variable	0·0	0·0	0·0	96	0·02
14	..	29·862	72·0	48·5	57·6	45·3	135·7	44·3	61·5	59·1	12·3	23·1	1·3	− 1·3	W : WSW	W : SW : SSW	0·7	0·0	0·0	291	0·00
15	Last Quarter In Equator	29·686	69·1	46·6	56·8	48·6	133·2	41·0	61·5	58·8	8·2	20·0	0·2	− 2·2	SSW	SSW : SSE	2·8	0·0	0·2	277	0·20
16	..	29·683	65·5	48·0	52·7	43·9	130·0	48·0	62·3	58·7	8·8	20·0	1·5	− 6·4	SE : NW	W : WSW	2·3	0·0	0·3	342	0·32
17	..	29·666	61·0	45·5	53·7	50·9	91·4	39·8	62·3	58·8	2·8	8·4	0·4	− 5·6	SSW	SSW : SW	2·4	0·0	0·4	380	0·00
18	..	29·895	72·0	49·5	58·0	47·1	134·1	45·0	62·1	58·7	10·9	22·0	4·0	− 1·5	WSW : W	WSW : SSW	1·0	0·0	0·1	287	0·00
19	..	29·967	76·9	45·3	59·8	53·1	138·8	40·4	61·9	58·3	6·7	17·7	0·0	+ 0·1	SSW	SSW : E	0·0	0·0	0·0	173	0·00
20	..	29·858	82·6	49·6	67·2	51·9	148·0	44·0	63·1	60·1	15·3	26·9	0·0	+ 7·3	E	E	2·4	0·0	0·2	222	0·00
21	Greatest dec. N. New	29·716	83·9	55·7	69·5	56·2	147·8	49·2	63·9	61·3	13·3	24·0	0·8	+ 9·4	NE : E	E : SW	1·0	0·0	0·1	231	0·00
22	Perigee	29·807	74·2	53·5	65·4	55·5	114·9	55·8	65·5	63·8	9·9	15·6	3·8	+ 5·0	NW : N	N : NNW	0·0	0·0	0·0	179	0·00
23	..	29·780	63·4	56·0	57·8	56·6	69·5	55·0	65·9	63·7	1·2	4·5	0·0	− 2·9	W : NW	N : NNE : ENE	0·0	0·0	0·0	107	0·27
24	..	29·730	70·0	52·7	58·8	53·0	132·5	48·7	66·1	63·3	5·8	14·4	0·0	− 2·4	N : NE : E	ENE : NE	2·5	0·0	0·2	264	0·06
25	..	29·786	72·6	49·5	61·9	46·1	139·4	43·8	66·1	63·3	15·8	24·5	0·4	+ 0·8	NNE : NE : ENE	ENE : NE	16·0	0·0	1·2	449	0·00
26	..	29·832	78·3	51·2	64·4	52·3	147·0	44·9	66·3	62·8	12·1	21·4	1·4	+ 3·2	NNE	NE : ENE : NNE	1·7	0·0	0·1	300	0·00
27	..	29·997	80·0	48·7	63·0	52·6	145·3	45·0	66·3	63·3	10·4	24·5	0·8	+ 1·7	NNE	NE : SE	0·5	0·0	0·0	170	0·00
28	In Equator First Quarter	29·911	81·8	53·5	67·1	52·9	131·0	49·0	66·8	64·3	14·2	26·7	0·0	+ 5·8	ESE : SW	SW : NW : N	0·1	0·0	0·0	95	0·00
29	..	29·786	73·4	53·8	60·7	52·8	126·3	48·8	67·3	65·3	7·9	18·4	3·0	− 0·6	N : NE	N : ESE	0·1	0·0	0·0	137	0·00
30	..	29·781	73·7	48·2	59·6	50·5	136·0	42·0	67·3	65·3	9·1	21·9	1·7	− 1·6	NNW : WSW : NW	WNW : WSW	0·4	0·0	0·0	211	0·00
Means	..	29·816	71·2	48·8	58·5	49·6	122·1	44·3	62·9	59·9	8·8	18·6	0·9	− 0·6	...	...	..	..	..	Sum 7044	Sum 1·08

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute maximum in the month was 30in·097 on the 1st; the first minimum in the month was 29in·591 on the 3rd.
The second maximum ,, was 29in·819 on the 4th; the second minimum ,, was 29in·682 on the 5th.
The third maximum ,, was 29in·861 on the 6th; the absolute minimum ,, was 29in·550 on the 9th.
The fourth maximum ,, was 30in·046 on the 10th; the fourth minimum ,, was 29in·624 on the 15th.
The fifth maximum ,, was 30in·003 on the 19th; the fifth minimum ,, was 29in·694 on the 21st.
The sixth maximum ,, was 29in·818 on the 22nd; the sixth minimum ,, was 29in·723 on the 24th.
The seventh maximum ,, was 30in·014 on the 27th; the seventh minimum ,, was 29in·759 on the 29th.
The range in the month was 0in·547.
The mean for the month was 29in·816, being 0in·003 *higher* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 83°·9 on the 21st; the lowest was 40°·1 on the 11th.
The range ,, was 43°·8.
The mean ,, of all the highest daily readings was 71°·2, being 0°·1 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 48°·8, being 1°·2 *lower* than the average of the preceding 35 years.
The mean daily range was 22°·4, being 1°·3 *greater* than the average of the preceding 35 years.
The mean for the month was 58°·5, being 0°·5 *lower* the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
June 1	0	0	v : v, cu.-s, cu, ci	5, cu.-s, cu, ci.-cu : 0
2	0	0	0 : v : 10, li.-cl, h	10, th.-cl, h : 10, r : 10, r
3	0	0	10 : v : 7, cu.-s, cu, ci	v, cu, ci, ci.-s : 10, r
4	0	0	10 : 9, th.-cl, h	6, cu.-s, ci.-cu, ci : 4, ci
5	0	0	v : 10, oc.-th.-r	10, oc.-th.-r : 10, oc.-r
6	0	0	10 : 10, oc.-th.-r	9, cu.-s, cu : 9, oc.-sl.-r
7	0	0	v : 6, cu.-s, ci.-cu	9, cu.-s, ci.-cu, ci : 10
8	0	0	10 : 8, cu.-s, cu, ci	10 : 10
9	0	0	10 : 10, r : 10, oc.-th.-r	10, oc.-th.-r : 9, oc.-th.-r
10	0	0	10 : 10	vv : v : 0
11	0	0	0 : 1, li.-cl	2, li.-cl : 1, ci.-s, li.-cl
12	0	0	v : 6, cu, ci, mt	7, cu.-s, ci : v, cu.-s, ci
13	0	0	v : 10	10, sl.-r : 10, r : 10, r
14	0	0	10 : v, ci.-cu, cu, cu.-s	7, cu.-s, ci.-cu : v, s, cu.-s, ci.-cu
15	0	0	1 : v : 9,cu.-s,cu,ci.-s	9, cu.-s : 10, r
16	0	0	10, r : 9, th.-r	v,cu.-s,ci.-cu,hl : v, ci.-cu, ci
17	0	0	v : 10, cu.-s, cu	10, oc.-th.-r : 10, oc.-th.-r
18	0	0	10 : 8, ci.-cu, cu.-s	8, ci.-cu, cu.-s : 0
19	0	0	0 : m, t : 9, cu, ci	v, ci.-cu, ci : 0
20	0	0	0 : 1, ci.-s	1, ci.-cu, ci : 0 : 0, m
21	0	0	0 : v : 2, ci.-cu, ci	4, ci.-s : v, li.-cl
22	0	0	v : 9, ci.-cu, ci, li.-cl	10, li.-cl : 10 : 10
23	0	0	10, r : 10, r : 10, r, gt.-glm	10, r : v, cu.-s, ci.-cu
24	0	0	v : 10, r	v, cu.-s, cu, ci : 0
25	0	0	0 : 1, ci.-cu, ci, w	1, ci.-cu, w : v, ci.-cu, ci
26	0	0	v : 2, cu, ci	6, cu.-s, cu : v, cu.-s, cu : 0
27	0	0	0 : 0 : li.-cl	2, ci, ci.-cu : 0, lu.-co, f
28	0	0	c, mt : 0, mt : 2, h	7, li.-cl, cu, h : v, cu.-s, ci.-cu, l, t
29	0	0	v : v : v, cu, ci.-cu, h	10, cu.-s, cu : 10
30	0	0	10 : 10 : v, cu.-s, cu, h	v, cu, ci : v, sl.-r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 49°·6, being 1°·3 *lower* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0in·356, being 0in·018 *less* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 4grs·0, being 0gr·2 *less* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 73 (that of Saturation being represented by 100), being 2 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 532 grains, being 1 grain *greater* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·5.

WIND.

The proportions were of N. 8, S. 6, W. 9, E. 7, and Calm 0. The greatest pressure in the month was 16lbs·0 on the square foot on the 25th. The mean daily horizontal movement of the air for the month was 235 miles; the greatest, 449 miles on the 25th; and the least, 95 miles on the 28th.

RAIN.

Fell on 10 days in the month, amounting to 1in·08, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·88 *less* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Temperature. Of the Air. Lowest.	Temperature. Of the Air. Mean Daily Value.	Temperature. Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind (Osler's). General Direction. A.M.	Wind (Osler's). General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
July 1	..	29·776	71·3	56·9	63·6	57·3	95·8	55·0	67·1	64·7	6·3	12·8	1·5	+ 2·4	SW : WSW	WSW	1·6	0·0	0·2	334	0·00
2	..	29·862	82·2	57·7	66·5	59·8	137·0	54·5	67·1	64·7	6·7	21·9	3·0	+ 5·4	WSW	WSW : W	0·5	0·0	0·0	255	0·00
3	..	29·942	82·0	56·9	66·2	59·1	150·0	51·0	67·3	65·1	7·1	20·6	2·9	+ 5·0	NE	WNW : WSW	0·6	0·0	0·0	204	0·00
4	..	29·875	78·9	56·9	65·3	57·5	120·8	50·7	68·1	65·3	7·8	19·4	1·1	+ 4·0	WSW	WSW	1·0	0·0	0·1	314	0·00
5	Greatest Declination S	29·791	71·7	58·3	64·1	58·2	109·2	53·5	68·1	65·3	5·9	10·7	1·5	+ 2·6	WSW : SW	SW : WSW	1·8	0·0	0·2	334	0·00
6	Apogee Full.	29·827	77·5	59·0	65·5	58·5	138·0	54·5	67·7	65·5	7·0	17·2	0·4	+ 3·9	WSW : W : SSW	SSW : S	0·0	0·0	0·0	163	0·11
7	..	29·646	78·4	59·7	67·6	59·3	149·2	58·0	67·9	65·3	8·3	18·7	0·6	+ 5·8	SW	WSW : SW	3·0	0·0	0·3	354	0·02
8	..	29·617	79·9	58·8	63·6	57·9	151·2	54·9	68·5	66·3	5·7	23·0	1·7	+ 1·6	SW	WSW	2·0	0·0	0·1	302	0·05
9	..	29·821	79·4	54·5	64·4	55·2	142·2	48·6	68·5	66·9	9·2	20·2	0·4	+ 2·3	WSW	WSW : SW	2·2	0·0	0·3	374	0·00
10	..	29·860	73·3	51·9	60·2	46·8	136·6	45·8	68·3	66·5	13·4	26·3	1·2	− 2·0	WSW : W	W : WNW	2·3	0·0	0·2	388	0·00
11	..	30·110	70·0	49·7	58·3	46·5	118·6	43·0	68·3	65·8	11·8	22·1	1·4	− 4·0	W : NW : NNW	NNW : N	1·4	0·0	0·0	236	0·00
12	In Equator	30·239	75·0	44·7	60·8	46·7	132·2	38·6	67·3	64·8	14·1	23·1	0·4	− 1·6	N : NW	NW : SW	0·2	0·0	0·0	153	0·00
13	..	30·211	85·2	52·2	68·0	55·9	127·6	45·4	67·3	64·8	12·1	24·4	3·2	+ 5·5	WSW : W : NW	Variable	0·0	0·0	0·0	135	0·00
14	Last Qr.	30·227	89·5	53·7	72·0	59·4	145·0	48·9	67·3	65·1	12·6	24·5	0·4	+ 9·4	Variable	E : SE	0·1	0·0	0·0	103	0·00
15	..	30·217	93·0	56·9	74·8	58·3	147·2	51·8	68·3	65·5	16·5	31·2	0·0	+ 12·1	Calm	NNE : ESE	0·3	0·0	0·0	112	0·00
16	..	30·152	89·9	56·1	71·6	55·2	148·8	48·0	69·1	66·3	16·4	35·5	0·0	+ 8·9	E : NE	E : SE : S	0·0	0·0	0·0	130	0·00
17	..	30·049	94·0	57·8	73·7	59·1	144·8	53·1	70·3	67·1	14·6	30·9	2·3	+ 11·0	WSW : NNW	NNW : N : ESE	1·7	0·0	0·0	211	0·00
18	..	30·019	81·0	51·6	66·7	52·8	152·5	46·0	70·9	68·3	13·9	23·0	0·6	+ 4·1	ENE	NE : W : NW	0·1	0·0	0·0	160	0·00
19	Greatest Declination N	29·942	84·0	59·5	69·3	59·4	144·1	52·6	71·3	68·5	9·9	25·0	5·9	+ 6·8	WNW : NNW	N : NE : ENE	1·0	0·0	0·1	244	0·00
20	Perigee	30·024	83·9	58·7	70·3	59·7	142·1	55·4	71·1	68·3	10·6	22·2	1·1	+ 7·9	SE : WSW	N : E : ENE	0·0	0·0	0·0	131	0·00
21	New	29·978	84·1	57·3	69·5	59·1	150·1	50·1	71·1	68·3	10·4	21·4	0·0	+ 7·2	ENE : NE	E : ESE	0·0	0·0	0·0	138	0·00
22	..	29·833	90·2	54·9	72·5	57·5	155·0	48·8	72·1	69·8	15·0	30·1	0·0	+ 10·2	E : SE	SW : S	0·0	0·0	0·0	135	0·00
23	..	29·741	71·5	56·6	61·4	58·6	114·8	50·5	72·3	70·3	2·8	12·4	0·0	− 0·8	SW : N	N : NNE	2·7	0·0	0·0	205	0·03
24	..	29·858	71·4	55·1	60·7	57·2	108·9	49·0	72·1	69·5	3·5	11·7	0·6	− 1·5	N	N	3·2	0·0	0·2	276	0·01
25	In Equator	29·983	83·2	53·2	67·2	57·5	144·2	45·8	71·3	68·5	9·7	21·2	2·2	+ 5·0	N	Variable	0·0	0·0	0·0	129	0·00
26	..	29·840	87·2	54·6	69·8	55·9	154·4	46·5	71·1	68·3	13·9	25·7	0·6	+ 7·6	SW : W	W : SW	2·5	0·0	0·1	323	0·00
27	..	29·866	74·0	55·0	63·2	46·8	135·5	50·0	69·9	67·3	16·4	23·8	2·1	+ 1·0	W : N	N : E : SE	0·5	0·0	0·0	204	0·05
28	First Qr.	29·508	71·2	53·0	60·9	54·5	92·8	47·0	70·3	68·1	6·4	15·3	2·0	− 1·3	S : SW	SW : WSW	2·5	0·0	0·2	319	0·26
29	..	29·806	75·2	51·3	61·4	48·3	140·0	44·6	69·5	67·8	13·1	23·0	0·8	− 0·9	WSW : W	W : WSW	2·3	0·0	0·3	387	0·00
30	..	29·823	78·0	54·0	63·5	51·9	144·8	46·8	69·3	66·5	11·6	24·6	1·4	+ 1·2	SW	SW	2·3	0·0	0·2	329	0·00
31	..	29·530	73·0	51·0	58·9	56·6	119·7	44·0	69·3	66·5	2·3	11·2	0·0	− 3·4	SSE : SSW	WSW : W	7·0	0·0	0·7	353	0·14
Means	..	29·902	80·0	55·1	65·9	55·7	135·3	49·4	69·3	66·8	10·2	21·7	1·3	+ 3·7	...	...	..	..	..	Sum 7435	Sum 0·67

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·973 on the 3rd; the first minimum in the month was 29in·575 on the 8th.
The absolute maximum ,, was 30in·262 on the 12th; the second minimum ,, was 29in·904 on the 19th.
The third maximum ,, was 30in·040 on the 20th; the third minimum ,, was 29in·741 on the 23rd.
The fourth maximum ,, was 30in·023 on the 25th; the fourth minimum ,, was 29in·775 on the 26th.
The fifth maximum ,, was 29in·885 on the 27th; the absolute minimum ,, was 29in·463 on the 28th.
The sixth maximum ,, was 29in·871 on the 29th; the sixth minimum ,, was 29in·499 on the 31st.
The range in the month was 0in·799.
The mean for the month was 29in·902, being 0in·100 *higher* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 94°·0 on the 17th; the lowest was 44°·7 on the 12th.
The range ,, was 49°·3.
The mean ,, of all the highest daily readings was 80°·0, being 5°·7 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 55°·1, being 2°·0 *higher* than the average of the preceding 35 years.
The mean daily range was 24°·9, being 3°·7 *greater* than the average of the preceding 35 years.
The mean for the month was 65°·9, being 3°·7 *higher* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
July 1	o	o	10 : 10	10, sl.-r : v, ci.-cu, cu.-s
2	o	o	v : 10, mt	9, ci, ci.-cu : 9, ci, ci.-cu
3	o	o	9 : 9, cu.-s, ci.-cu	9, cu.-s, ci.-cu, cu : v
4			v : 9, cu. ci.-cu, cu.-s	10 : v, cu.-s, ci
5			v : 9, cu.-s, cu	9, sl.-r : 10
6			v : 7, cu.-s, ci.-cu, ci, so.-ha	v, cu.-s, cu, th.-r : 9, r
7			10, r : v : v, ci.-cu, cu	9, cu.-s, ci : 10, sl.-r
8			v : 7, ci, ci.-cu, cu.-s	9, fr.-r : 4 : o
9			v : 8, cu.-s, ci.-cu	6, ci, ci.-cu : 7, cu.-s
10			8, ci.-cu, cu	v, cu.-s, ci.-cu, ci : v, cu, ci.-cu
11			v, cu.-s	7, ci.-cu, cu.-s : 9, cu, ci, ci.-cu
12			v : 4, cu, ci.-cu	3, ci.-cu, cu : 2, ci.-cu, cu : o
13	o	o	v : 6, ci, h	2, ci : o : o
14	o	o	o : o : ci	o : o
15	o	o	o : o	2, ci.-cu : 3, ci.-cu : 2, ci
16	o	w : o : o	o : ci	1, ci : 10
17	o	o	v : 1, ci, h	v, cu, ci.-cu, ci : v, ci
18	o	o	v : 2, ci	10, li.-cl : v, ci.-cu
19	o	o	v : 7, cu.-s, cu, ci	6. ci.-cu, cu.-s, ci : 2, ci.-s
20	o	o	2, ci : 4, li.-cl, h	3, li.-cl, h : 1, ci : o
21	o : o : w	o	o : ci	1,ci.-cu,li.-cl,h : o : o
22	o : o : w	o : w	o : v, li.-cl	o : li.-cl : 2, li.-cl
23	o	o : sP, sN, g.-cur, sp	v : 10, th.-r	10, cu.-s, r : v, cu.-s, ci : 10, l, t, m
24	o : w	o	10 : 10, th.-r	10, sl.-r : v : o, ms
25	o	o	o : v, li.-cl	7, cu.-s, ci : v, li.-cl, f, m
26	o : w	o	v, li.-cl : 1, ci.-s	2, cu, ci : 1, cu, ci
27	o	o	v, r : v, ci	3, ci.-cu, ci, h : 10
28	o	o	10 : 10, th.-r	10, r : v, r : v, cu.-s, cu, ci
29	o	o	v : 8, cu.-s, cu, ci	v, cu, ci.-cu, ci : vv, ci.-cu, ci
30	o	o	vv : v, ci.-cu, ci	v, ci.-cu, ci : 3, ci.-cu, ci, ci.-s
31	o	o	v : 10, r	9, ci.-cu, cu.-s, sh.-r : vv, oc.-shs

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 55°·7, being 1°·6 *higher* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0in·444, being 0in·024 *greater* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 4gr·9, being 0gr·2 *greater* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 70 (that of Saturation being represented by 100), being 5 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 526 grains, being 1 grain *less* than the average of the preceding 35 years.

CLOUDS.
The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 5·5.

WIND.
The proportions were of N. 7, S. 7, W. 12, E. 5, and Calm 0. The greatest pressure in the month was 7lbs·0 on the square foot on the 31st. The mean daily horizontal movement of the air for the month was 240 miles; the greatest, 388 miles on the 10th; and the least, 103 miles on the 14th.

RAIN.
Fell on 8 days in the month, amounting to 0in·67, as measured in the simple cylinder gauge partly sunk below the ground; being 1in·92 *less* than the average fall of the preceding 61 years.

ELECTRICITY.
From July 4 to 12, the electrical apparatus was under examination.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	Osler's. General Direction. P.M.	Osler's. Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Aug. 1	Greatest Declination S	29·884	71·0	47·2	57·5	45·0	143·5	39·5	68·8	66·3	12·5	21·6	2·9	− 4·8	WSW	WSW : SW	5·3	0·0	0·9	461	0·00
2	Apogee	29·837	75·6	47·5	61·9	47·6	136·4	40·8	67·5	65·3	14·3	28·6	0·4	− 0·4	S : SSW	S : SW	1·6	0·0	0·1	280	0·00
3	..	29·454	75·8	55·6	62·3	54·0	143·3	48·0	67·3	64·8	8·3	19·4	1·3	+ 0·1	WSW	WSW	7·8	0·0	1·4	534	0·06
4	..	29·855	74·6	53·2	59·8	54·6	114·3	45·6	67·1	64·6	5·2	18·5	0·0	− 2·4	SW	WSW: SW: SSE	3·7	0·0	0·4	357	0·36
5	Full	30·015	75·5	56·5	64·3	53·2	131·3	56·0	66·5	63·1	11·1	21·8	0·2	+ 2·2	S : NW : NNW	WNW : W : SW	0·4	0·0	0·0	244	0·11
6	..	30·095	77·0	51·1	62·7	55·0	132·0	44·8	65·3	61·8	7·7	20·4	0·0	+ 0·6	WSW : W	WSW : SW	0·3	0·0	0·0	266	0·00
7	..	29·995	82·6	58·2	69·1	59·1	145·6	52·0	65·3	62·3	10·0	19·9	1·1	+ 7·1	SSW : SW	WSW	1·7	0·0	0·1	318	0·00
8	In Equator	29·971	84·7	56·0	69·0	55·5	145·0	49·8	66·3	63·3	13·5	26·2	0·0	+ 7·0	WSW : W	W : NW : ENE	0·0	0·0	0·0	142	0·00
9	..	29·906	91·2	55·0	71·6	57·6	150·2	49·0	67·3	65·1	14·0	29·6	0·0	+ 9·5	E: NE: SW	SSW: SW: WSW	0·5	0·0	0·0	158	0·00
10	..	30·121	80·4	54·5	64·8	52·2	142·8	48·6	68·3	65·3	12·6	23·8	0·8	+ 2·7	N : NNE	NNE: ESE: E	0·3	0·0	0·0	190	0·00
11	..	30·152	77·4	47·9	62·4	47·2	151·0	40·5	68·8	66·3	15·2	28·1	0·0	+ 0·2	NE : E	ESE : E	0·3	0·0	0·0	165	0·00
12	Last Qr.	29·964	82·2	50·3	67·6	51·4	156·5	43·0	68·8	66·3	16·2	27·5	0·0	+ 5·4	ENE : E	E: ENE	1·7	0·0	0·1	225	0·00
13	..	29·772	92·6	58·8	76·7	55·3	149·0	52·0	68·8	65·5	21·4	33·9	0·0	+14·5	E	E: ESE	2·1	0·0	0·2	200	0·00
14	..	29·751	93·8	57·2	75·2	57·9	154·7	52·0	69·8	67·5	17·3	31·2	0·0	+13·2	SW : WSW	W : WSW	0·0	0·0	0·0	127	0·00
15	Greatest Declination N	29·796	93·1	62·0	76·2	59·0	152·5	54·7	71·1	68·3	17·2	32·6	1·0	+14·5	WSW	W : ESE : E	0·7	0·0	0·0	135	0·00
16	..	29·806	88·2	61·5	72·8	60·1	140·1	57·4	71·5	68·5	12·7	26·6	0·0	+11·4	E : NE	ESE : E	0·4	0·0	0·0	157	0·00
17	Perigee	29·758	83·5	58·6	70·1	59·9	138·3	55·0	71·8	69·1	10·2	20·3	1·1	+ 8·9	ENE	E : ENE	1·0	0·0	0·1	280	0·00
18	..	29·794	72·4	63·1	65·7	64·0	83·8	58·7	71·1	69·1	1·7	4·2	0·0	+ 4·7	ENE : E : ESE	Variable	1·0	0·0	0·0	142	0·21
19	New	29·690	75·8	61·6	67·1	61·9	97·2	59·7	71·8	69·5	5·2	11·7	0·0	+ 6·2	ENE : E	ENE : NE	0·0	0·0	0·0	143	0·04
20	..	29·598	70·3	56·4	61·6	58·6	106·5	52·0	71·3	69·5	3·0	10·6	0·0	+ 0·8	ENE : E	S : SE	2·7	0·0	0·1	206	0·53
21	In Equator	29·710	77·5	54·7	64·7	60·1	134·8	50·3	71·3	69·3	4·6	15·3	0·0	+ 4·0	ENE : NE	SW	0·0	0·0	0·0	119	0·07
22	..	29·691	75·6	56·0	62·5	57·3	110·2	50·2	71·1	68·8	5·2	11·4	0·0	+ 1·8	WSW	WSW: WNW: NNW	0·1	0·0	0·0	197	0·00
23	..	29·642	69·6	51·5	59·5	45·7	128·6	48·7	69·8	67·5	13·8	22·5	5·4	− 1·2	NNW : N	N : NNW	0·6	0·0	0·0	212	0·00
24	..	29·659	67·9	48·0	57·9	47·5	122·3	42·7	69·3	67·3	10·4	18·7	1·7	− 2·7	NNW : N	NW : WNW : N	1·4	0·0	0·1	222	0·01
25	..	29·810	65·0	43·5	52·8	39·9	124·2	37·0	69·1	66·5	12·9	21·9	1·8	− 7·7	N	N : NNE	2·0	0·0	0·2	235	0·00
26	First Qr.	29·761	69·4	41·1	53·8	44·6	140·7	34·1	67·3	65·3	9·2	24·7	1·8	− 6·6	WSW : W	WSW : SW	3·3	0·0	0·4	341	0·03
27	..	29·584	69·9	52·8	59·1	47·2	123·0	46·5	67·1	64·6	11·9	20·7	3·4	− 1·2	WSW : WNW	NW : NNW	2·7	0·0	0·6	434	0·00
28	Greatest Declination S.	29·766	69·2	47·6	57·9	53·4	90·3	41·4	66·6	63·8	4·5	14·2	0·4	− 2·3	WSW	SW	1·2	0·0	0·1	284	0·16
29	Apogee	29·560	70·5	51·5	59·8	48·0	126·0	45·0	65·1	62·8	11·8	20·0	1·7	− 0·3	SW : WSW	W : NW : WSW	3·6	0·0	0·8	439	0·01
30	..	29·410	70·5	50·5	58·5	50·3	126·7	43·9	64·9	62·6	8·2	19·1	0·6	− 1·5	WSW : SW	SSW : WSW	2·6	0·0	0·3	372	0·17
31	..	29·011	60·0	45·1	50·9	45·4	118·8	40·9	64·3	61·7	5·5	13·9	1·3	− 8·9	SW : W	WSW: W: WNW	6·0	0·0	1·1	357	0·25
Means	..	29·768	76·8	53·4	63·7	53·2	131·0	47·7	68·4	65·9	10·6	21·3	0·9	+ 2·4	...	...	..	..	..	Sum 8142	Sum 2·01

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·960 on the 1st; the first minimum in the month was 29in·314 on the 3rd.
The second maximum ,, was 30in·118 on the 6th; the second minimum ,, was 29in·877 on the 9th.
The absolute maximum ,, was 30in·187 on the 11th; the third minimum ,, was 29in·731 on the 14th.
The fourth maximum ,, was 29in·824 on the 16th; the fourth minimum ,, was 29in·726 on the 17th.
The fifth maximum ,, was 29in·826 on the 18th; the fifth minimum ,, was 29in·556 on the 20th.
The sixth maximum ,, was 29in·729 on the 21st; the sixth minimum ,, was 29in·627 on the 23rd.
The seventh maximum ,, was 29in·871 on the 25th; the seventh minimum ,, was 29in·518 on the 27th.
The eighth maximum ,, was 29in·833 on the 28th; the eighth minimum ,, was 29in·500 on the 29th.
The ninth minimum ,, was 29in·651 on the 29th; the absolute minimum ,, was 28in·964 on the 31st.
The range in the month was 1in·223.
The mean for the month was 29in·768, being 0in·027 *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 93°·8 on the 14th; the lowest was 41°·1 on the 26th.
The range ,, was 52°·7.
The mean ,, of all the highest daily readings was 76°·8, being 3°·8 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 53°·4, being 0°·3 *higher* than the average of the preceding 35 years.
The mean daily range was 23°·4, being 3°·6 *greater* than the average of the preceding 35 years.
The mean for the month was 63°·7, being 2°·2 *higher* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Aug. 1	0 : 0 : mN,g.-cur	0	vv : v, cu, ci, ci.-cu	vv, cu, ci, sc : 0
2	0	0	v : v : v, cu, ci	v, cu, ci, ci.-cu : v, li.-cl
3	0	0	10 : v, r : vv, cu.-s, cu, ci	v, cu, ci : vv, ci.-cu
4	0	0	v : v, th.-r	9, r : 10, r
5	0	0	10, oc.-r : v, cu, ci	7, ci.-cu, cu.-s : v, cu.-s
6	0	0	v : 6, ci.-cu, cu	8, ci, ci.-cu : v, ci, ci.-cu
7	0	0	v : 4, ci, ci.-cu	1, ci : 4, li.-cl, ms
8	0	0	6 : 6, li.-cl, mt, h	4, li.-cl, h : 0, mt, ms
9	0	0	0, mt : 0, h	0 : 2, li.-cl : 5, ms
10	0	0	6 : 7, ci.-cu, ci	6, li.-cl : li.-cl : v, li.-cl, h.-d, ms
11	0	0	li.-cl, m : 2, ci, ci.-s	2, ci : 0 : 0, h.-d, ms
12	0	0	0, ms : 0	0 : 0 : v
13	0	0	0 : 0	0 : 0, ms
14	0	0	0, ms : 0	0 : 0, ms
15	0	0	0 : 0	5, cu.-s, cu, ci : 6, ci.-cu, cu.-s, sl.-r, l, t
16	0	0	v, mt : 1, ci.-cu, ci, ci.-s	4, ci, ci.-cu, ci.-s, t : 0, ms
17	0	0	0 : 2, cu, ci	0 : 1, li.-cl
18	0	0	v : 10, r	10, r : v, f, mt
19	0	0	v : 10, r : 9, cu, ci, r	10 : v, l
20	0	0	10, t.-s : 10, r	10, oc.-r : v, oc.-r : v, m
21	0	w : 0 : 0	v, ci.-cu : 8, cu, cu.-s	v, shs.-r : v : 0
22	0	0	v : 10, oc.-th.-r	9, sl.-r : v
23	0	0	v : 1, ci	1, ci, ci.-cu : v, ci.-cu
24	0	0	v : v, cu.-s, ci.-cu, ci	7, cu.-s, ci.-cu : v, sl.-r : v, m
25	0	0	v : v, cu, ci	5, cu.-s, cu, ci : v : v, ms
26	0	w : 0 : 0	v : v	v, cu.-s, cu, ci : v, shs
27	0	0	v : 7, ci.-cu	9 : 9 : ms
28	0	0	10 : 10	10 : 10, r : 10, h.-r
29	0	0	10, sl.-r : v, cu, cu.-s, ci	v, cu.-s, cu, ci.-cu : vv, ci.-s, cu.-s, ms
30	0	0	v : v, ci, ci.-cu, cu	9, cu.-s, ci.-cu : 10 : 10, r
31	0	0	10, sh.-r : 10, th.-r	10, oc.-th.-r : 10, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $53^{\circ}\cdot2$, being $0^{\circ}\cdot7$ *lower* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot406$, being $0^{in}\cdot012$ *less* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot5$, being $0^{gr}\cdot1$ *less* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 69 (that of Saturation being represented by 100), being 8 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 526 grains, being 2 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was $5\cdot1$.

WIND.

The proportions were of N. 5, S. 7, W. 12, E. 7, and Calm 0. The greatest pressure in the month was $7^{lbs}\cdot8$ on the square foot on the 3rd. The mean daily horizontal movement of the air for the month was 263 miles; the greatest, 557 miles on the 31st; and the least, 119 miles on the 21st.

RAIN.

Fell on 13 days in the month, amounting to $2^{in}\cdot01$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot37$ *less* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	WIND AS DEDUCED FROM ANEMOMETERS. OSLER'S. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	ROBINSON'S. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Sept. 1	..	29·409	68·9	48·3	55·9	50·2	119·8	42·0	62·3	60·1	5·7	17·1	1·2	− 3·5	WNW	W : WSW	3·7	0·0	0·8	450	0·09
2	..	29·673	67·2	46·3	55·0	49·3	108·2	40·4	61·9	58·7	5·7	17·1	0·0	− 4·3	WSW : NW	NW : NNE : E : S	0·5	0·0	0·0	154	0·06
3	Full	29·795	66·0	50·1	56·1	49·7	104·0	47·4	61·8	59·3	6·4	14·9	0·0	− 3·0	SW : W : NW : N	NW : W : SW : S	0·0	0·0	0·0	169	0·05
4	..	29·547	69·3	53·5	60·8	58·5	98·0	50·6	61·3	58·3	2·3	9·0	0·0	+ 2·0	S : SW	SW : S	6·0	0·0	0·5	380	0·13
5	In Equator	29·519	71·6	56·8	62·4	54·0	116·2	53·0	61·8	59·3	8·4	15·1	2·3	+ 3·8	SW	SW	11·5	0·0	1·1	522	0·29
6	..	29·436	69·3	56·8	60·9	51·3	123·6	52·6	62·9	60·3	9·6	18·2	0·6	+ 2·5	SW : SSW : W	W : SW	4·1	0·0	0·7	498	0·23
7	..	29·386	67·9	53·0	57·4	50·3	122·0	50·6	62·9	60·7	7·1	14·8	0·6	− 1·0	SW : W	W : NW : SSW	2·7	0·0	0·1	320	0·15
8	..	29·543	63·7	47·2	53·6	45·4	106·2	44·4	62·1	60·3	8·2	15·1	0·2	− 4·7	NW : W	NW : W	1·5	0·0	0·1	316	0·02
9	..	29·573	63·4	44·1	51·3	48·4	102·7	39·0	62·1	59·8	3·1	10·6	0·0	− 6·6	WSW : W	W : NW	2·9	0·0	0·1	329	0·12
10	..	29·605	62·4	45·5	52·5	47·5	104·7	41·2	61·3	59·5	5·0	13·1	0·0	− 5·5	W : WSW : WNW	NW : WNW : W	0·3	0·0	0·0	261	0·04
11	Last Quarter Greatest Dec. N	29·638	60·9	44·5	51·7	42·5	105·0	39·2	60·5	58·5	9·2	16·3	0·0	− 6·1	WSW : W : NW	WNW : W	1·0	0·0	0·1	303	0·00
12	..	29·704	59·6	43·9	50·3	42·2	99·2	36·5	60·1	57·8	8·1	15·4	0·7	− 7·3	WSW : N	N : NW : WNW	0·8	0·0	0·0	211	0·02
13	..	29·614	55·1	41·6	48·4	46·2	76·8	36·6	59·5	57·3	2·2	7·6	0·0	− 9·0	WNW : W : NW	NW : W : NNW	0·1	0·0	0·0	208	0·01
14	Perigee	29·608	62·4	46·0	53·0	46·8	104·6	42·0	59·3	57·1	6·2	13·1	1·9	− 4·2	NNW : N	N : NNW	0·2	0·0	0·0	136	0·00
15	..	29·583	66·0	42·5	53·0	45·6	107·8	39·0	58·8	56·3	7·4	15·1	0·0	− 4·1	Variable	SSW : S	0·0	0·0	0·0	144	0·00
16	..	29·466	57·2	42·3	51·6	50·8	69·3	37·1	58·3	56·1	0·8	4·6	0·0	− 5·3	E : ESE : ENE	ESE : E : WSW	0·3	0·0	0·0	157	0·12
17	New	29·616	70·0	48·0	54·6	49·5	128·0	46·1	58·3	56·1	5·1	16·7	0·0	− 2·0	WSW : W	WSW : SW	0·8	0·0	0·0	267	0·12
18	In Equator	29·747	70·5	47·3	58·1	50·2	117·8	43·2	58·3	56·3	7·9	17·8	0·0	+ 1·7	SW : WSW	W : WSW	1·9	0·0	0·2	332	0·04
19	..	30·096	66·9	48·5	56·7	47·9	103·2	40·2	58·3	56·8	8·8	17·5	0·2	+ 0·6	W : NW : N	NW : W : SW	0·1	0·0	0·0	198	0·00
20	..	30·199	66·0	46·3	55·9	51·3	98·4	40·7	58·5	56·1	4·6	12·6	0·0	+ 0·1	WSW : NE	SE : S	0·0	0·0	0·0	127	0·00
21	..	30·034	72·5	41·6	56·5	50·2	116·7	38·0	59·1	57·1	6·3	18·0	0·0	+ 1·0	SE : E	SSW : SE	0·0	0·0	0·0	110	0·00
22	..	29·834	71·5	47·2	60·2	48·4	117·9	41·9	59·1	57·3	11·8	19·4	0·0	+ 4·9	SE	SSE : SE	0·4	0·0	0·0	170	0·00
23	..	29·694	71·3	54·5	60·4	56·5	118·2	48·0	60·1	57·8	3·9	11·9	0·4	+ 5·2	SE	SW : WSW	1·0	0·0	0·0	205	0·13
24	..	29·518	66·0	54·2	58·8	55·8	105·0	47·0	60·3	58·5	3·0	6·3	0·2	+ 3·8	SSW : SSE : S	SW	7·7	0·0	0·9	399	0·09
25	Greatest Dec. S. First Quarter	29·707	65·0	53·6	58·2	49·3	104·8	47·4	60·3	58·5	8·9	12·7	4·0	+ 3·4	WSW : W	W : WSW	6·8	0·0	1·7	561	0·00
26	Apogee	29·488	68·9	52·6	59·4	56·1	107·0	46·2	60·1	58·1	3·3	7·6	1·1	+ 4·7	SW : SSE : S	SW : WSW	3·8	0·0	0·2	305	0·03
27	..	29·482	58·5	54·7	55·5	53·3	65·0	51·0	60·3	58·3	2·2	2·9	0·8	+ 0·9	WSW : NNE	N : S : SSE	0·0	0·0	0·0	140	0·10
28	..	29·203	67·3	52·8	58·4	53·7	111·8	47·4	60·5	58·7	4·7	11·5	0·4	+ 3·9	SSW	SSW : SW : WSW	1·7	0·0	0·1	272	0·10
29	..	29·511	65·2	47·0	54·5	47·3	110·5	43·0	60·5	58·7	7·2	15·7	1·0	+ 0·1	N : NW : W	WNW : WSW : SSE : NE	1·5	0·0	0·0	223	0·08
30	..	29·263	60·0	46·1	52·9	52·8	76·8	41·9	60·1	57·8	0·1	4·4	0·0	− 1·4	ENE : E	E : ESE	3·5	0·0	0·2	295	0·56
Means	..	29·620	65·7	48·6	55·8	50·0	105·0	43·8	60·4	58·2	5·8	13·1	0·5	− 1·0	...	...	..	..	..	Sum 8162	Sum 2·58

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·824 on the 3rd; the first minimum in the month was 29in·483 on the 5th.
The second maximum ,, was 29in·572 on the 5th; the second minimum ,, was 29in·372 on the 6th.
The third maximum ,, was 29in·527 on the 6th; the third minimum ,, was 29in·375 on the 7th.
The fourth maximum ,, was 29in·713 on the 12th; the fourth minimum ,, was 29in·447 on the 16th.
The absolute maximum ,, was 30in·213 on the 20th; the fifth minimum ,, was 29in·677 on the 23rd.
The sixth maximum ,, was 29in·748 on the 23rd; the sixth minimum ,, was 29in·400 on the 24th.
The seventh maximum ,, was 29in·775 on the 25th; the seventh minimum ,, was 29in·167 on the 28th.
The eighth maximum ,, was 29in·575 on the 29th; the absolute minimum ,, was 29in·144 on the 30th.
The range in the month was 1in·069.
The mean for the month was 29in·620, being 0in·187 *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 72°·5 on the 21st; the lowest was 41°·6 on the 13th and 21st.
The range ,, was 30°·9.
The mean ,, of all the highest daily readings was 65°·7, being 2°·1 *lower* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 48°·6, being 0°·6 *lower* than the average of the preceding 35 years.
The mean daily range was 17°·1, being 1°·4 *less* than the average of the preceding 35 years.
The mean for the month was 55°·8, being 1°·5 *lower* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Sept. 1	o	w : o	10 : v, cu, ci.-cu, ci	5,cu.-s,cu,ci.-cu,r : v : o
2	o	o	o : v, r : v, mt	v,cu.-s,cu,th.-r : 9, r : 9
3	o	o	v : 8, r	8, cu.-s, ci.-cu : v, cu.-s, ci.-cu
4	o	o	9 : 10, r	9, oc.-r : 10, oc.-li.-shs
5	o	o	10, h.-r : 9, cu.-s, cu, ci	v, cu.-s, cu, ci : vv, cu, ci
6	o	o	10, r : vv, cu.-s, ci.-cu	3, cu, ci.-cu, ci : v : 10
7	o	o	10 : 10, r : 10, cu.-s, cu, ci, oc.-shs	8,cu.-s,cu,ci,t,mt : 8, cu, ci.-cu, r : v, cu, ci.-cu
8	o	o	v : v, r : v, ci.-cu, ci	8, cu.-s, ci.-cu : v, ci.-s
9	o	o	2, lu.-ha : v : 9,sh.-r,cu.-s,cu	10, r : v, sh.-r : 10
10	o	o	10 : 10 : 10, ci.-cu, cu.-s, mt	10, r : + : o
11	o	o	v : 9, cu.-s, cu, ci	8, cu.-s, cu, ci.-cu : v : o
12	o	o	v : 9, th.-r	v : 8, cu.-s, cu, ci : 9
13	o	o	v : 9, cu.-s, ci.-cu, h, mt	10, oc.-th.-r, mt : 10, h.-r, glm : 10, r
14	o	o	v : 9, cu, ci.-cu	9, cu.-s, cu, ci.-cu, mt : v, mt : o, mt
15	o	o	o, mt : v, ci, f, mt, h	8,cu.-s,ci.-cu,ci : 3, cu.-s, ci.-cu : o, m
16	o	o	v : 10, r	10, r : 10 : 10
17	o	o	10 : v, ci.-s, cu, cu.-s	vv, r, t : v, m
18	o	sP,sN,g.-cur,sp : o	v : 10, sl.-r	vv, ci.-cu, cu : vv, ci.-cu, cu
19	o	o	v : 2, h, cu, ci	3, cu, ci, ci.-s : 1, ci.-s : 1, m
20	o	o	1, ci : 1, ci, h, mt, f, glm	th.-cl, h, f : f, mt : o, m
21	o	o	o : o, th.-f	ci : o
22	o	o	o : o, sl.-f : o	1, ci, cu : vv, sl.-r
23	o : m,g.-cur	ssP,ssN,g.-cur,sp : o	v, r : v, oc.-r : 10, r	8, r, t, ci.-cu, cu : v, cu, ci.-cu : o
24	o : o : w	o : o	v : 10, r	10 : vv, l : 2
25	o	o	v : vv, ci.-cu	vv, ci, ci.-cu : 4, cu.-s
26	o	o	+ : 10, th.-r : 10, r	10 10, th.-r
27	o	o	10, r : 10, r : 10	10 10, r
28	o : o : m,g.-cur,sp	w : o	10 : 10, r, cu.-s ci.-cu	7, cu.-s, ci, r vv
29	o	o	r : v, cu, ci, cu.-s	2, cu, ci : v v,li.-cl,mt,lu.-ha
30	o	o	th.-cl, mt : 10, r	10, r 8, ci.-cu, r 9, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 50°·0, being 1°·3 *lower* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0in·361, being 0in·019 *less* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 4grs·1, being 0gr·2 *less* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 81 (that of Saturation being represented by 100), being 1 *greater* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 531 grains, being 2 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·6.

WIND.

The proportions were of N. 4, S. 9, W. 15, E. 2, and Calm 0. The greatest pressure in the month was 11lbs·5 on the square foot on the 5th. The mean daily horizontal movement of the air for the month was 272 miles, the greatest, 561 miles on the 25th; and the least, 110 miles on the 21st.

RAIN.

Fell on 22 days in the month, amounting to 2in·58, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·12 *greater* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Temperature. Of the Air. Lowest.	Temperature. Of the Air. Mean Daily Value.	Temperature. Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference Greatest.	Difference Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure Least.	Pressure Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Oct. 1	..	29·734	60·3	44·0	51·1	45·5	105·2	38·5	59·5	57·8	5·6	11·6	2·2	− 3·3	NE : NNE	NE : ENE	2·7	0·0	0·4	329	0·20
2	In Equator	29·971	56·2	42·1	50·1	40·2	77·7	36·8	59·1	57·1	9·9	14·0	2·2	− 4·1	E : SE	SE	1·5	0·0	0·0	217	0·00
3	Full	29·701	67·0	48·4	57·5	52·7	101·5	44·6	58·3	56·3	4·8	9·5	2·9	+ 3·6	SE : ESE	S : SE	0·0	0·0	0·0	160	0·01
4	..	29·655	69·4	51·9	59·9	54·2	105·8	46·0	58·5	56·3	5·7	10·8	0·9	+ 6·4	ESE : SW	SW : S	3·2	0·0	0·2	286	0·04
5	..	29·773	70·9	54·0	61·5	52·6	118·8	48·2	58·5	56·6	8·9	16·6	3·0	+ 8·3	SSW	S : SE : ESE	0·4	0·0	0·0	225	0·00
6	..	29·701	72·2	56·5	63·1	58·4	108·2	50·9	58·6	57·1	4·7	10·0	0·9	+ 10·2	SSE : SE	SW : SSW	0·5	0·0	0·0	201	0·01
7	..	29·755	70·7	58·9	63·0	60·3	99·1	55·9	59·3	57·5	2·7	6·5	0·6	+ 10·4	SE : SSE : SW	WSW : SSW	0·0	0·0	0·0	168	0·20
8	..	29·705	65·2	58·2	62·0	60·0	75·1	55·9	60·3	58·3	2·0	4·9	1·5	+ 9·8	SE : SSW	SE : ESE : E	0·0	0·0	0·0	152	0·03
9	Greatest Declination N	29·417	65·8	56·5	59·9	53·7	105·7	52·4	60·3	58·5	6·2	12·6	2·3	+ 8·0	SSW	WSW : SW	10·0	0·0	1·5	543	0·00
10	Last Quarter Perig	29·324	60·2	52·8	55·3	54·2	67·4	47·8	60·3	58·5	1·1	3·0	0·8	+ 3·7	SW : W	SW : SSW	3·4	0·0	0·4	382	0·53
11	..	29·127	63·7	53·0	57·7	50·8	99·2	47·4	59·5	57·8	6·9	9·5	3·0	+ 6·4	SSW	SSW	8·3	0·0	1·0	476	0·18
12	..	29·507	66·4	49·5	56·5	48·7	99·5	44·3	59·5	57·8	7·8	16·2	1·2	+ 5·5	SSW : S	S : SE : ESE	1·8	0·0	0·1	277	0·15
13	..	29·455	63·1	50·8	56·8	55·3	75·5	45·2	59·1	57·1	1·5	4·4	0·0	+ 6·1	SE : S : SSW	SW : SSW	0·0	0·0	0·0	221	0·00
14	..	29·592	62·0	45·4	52·8	50·6	96·5	41·0	59·5	57·5	2·2	9·9	0·6	+ 2·4	SSW : SSE : S	SW	4·0	0·0	0·1	243	0·10
15	In Equator	29·754	62·6	41·5	51·4	44·2	105·2	36·8	59·1	56·7	7·2	14·4	0·4	+ 1·2	SW : SSW	SW : SSW : S	0·0	0·0	0·0	227	0·00
16	..	29·543	62·7	41·5	53·4	49·2	94·2	35·0	58·3	55·8	4·2	10·3	0·0	+ 3·4	SSE	SSE	0·5	0·0	0·0	228	0·00
17	New	29·498	69·0	50·5	59·4	53·7	112·3	45·7	57·5	55·3	5·7	12·1	1·8	+ 9·6	SE : ESE	SE : ESE	0·3	0·0	0·0	196	0·00
18	..	29·498	66·2	50·1	57·3	53·9	93·0	44·4	58·1	55·3	3·4	8·8	0·0	+ 7·6	ESE : ENE : E	SE	0·0	0·0	0·0	147	0·00
19	..	29·651	66·5	48·3	56·4	52·6	105·8	42·1	57·7	55·3	3·8	11·3	0·0	+ 6·9	E : ENE : NE	E : NE	0·3	0·0	0·0	197	0·00
20	..	29·833	54·6	49·5	51·9	48·9	57·4	49·4	58·3	55·7	3·0	4·8	2·4	+ 2·6	NNE : NE	NE	1·3	0·0	0·1	335	0·00
21	..	29·913	50·7	42·5	46·4	40·3	68·1	39·3	57·3	55·3	6·1	9·5	3·3	− 2·6	NNE : NE	NE	3·0	0·0	0·4	411	0·00
22	Greatest Declination S.	29·913	48·2	44·0	45·6	42·2	55·8	43·0	56·5	54·5	3·4	7·4	1·1	− 3·1	ENE	ENE	3·7	0·0	0·3	366	0·10
23	..	29·913	46·9	43·5	45·2	44·3	49·8	43·5	55·5	53·3	0·9	1·9	0·0	− 3·1	NE	NE	0·0	0·0	0·0	163	0·06
24	Apogee	29·994	49·4	43·4	45·6	41·9	56·3	43·4	55·3	52·7	3·7	8·4	2·9	− 2·3	NE : N	NNE : WSW	0·0	0·0	0·0	84	0·00
25	First Qr.	30·134	50·5	35·0	42·2	39·6	58·3	31·0	54·8	52·3	2·6	9·2	0·0	− 5·3	SW	NE : SE	0·0	0·0	0·0	100	0·00
26	..	30·117	53·7	43·7	48·9	43·2	67·5	40·9	54·3	52·1	5·7	9·0	3·6	+ 1·7	E	E : NE	0·0	0·0	0·0	84	0·00
27	..	30·070	48·4	42·5	46·0	42·4	52·2	38·0	54·1	51·5	3·6	5·0	1·5	− 0·9	SE	NE : E	0·0	0·0	0·0	107	0·00
28	..	30·081	51·4	44·7	47·7	43·3	59·5	44·7	53·8	50·6	4·4	7·4	0·0	+ 1·0	NE : NNE	NNE : NE	0·0	0·0	0·0	116	0·00
29	In Equator	30·070	55·0	39·5	46·8	40·9	81·2	34·3	53·5	50·3	5·9	12·2	1·1	+ 0·2	NNE : SW : W	WSW	0·0	0·0	0·0	150	0·00
30	..	29·991	55·7	41·5	47·7	41·0	73·0	35·5	53·3	50·3	6·7	11·0	2·4	+ 1·2	W	NNW : N	2·5	0·0	0·1	332	0·00
31	..	30·035	46·2	34·5	39·2	29·9	82·0	28·6	53·1	49·1	9·3	14·3	4·9	− 7·2	NNW : N	N	1·6	0·0	0·2	309	0·00
Means	..	29·756	59·7	47·0	52·8	48·0	84·1	42·9	57·4	55·2	4·8	9·6	1·5	+ 2·7	...	...	..	..	..	Sum 7432	Sum 1·61

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·025 on the 2nd; the first minimum in the month was 29in·638 on the 4th.
The second maximum .. was 29in·803 on the 5th; the second minimum ,, was 29in·684 on the 6th.
The third maximum .. was 29in·800 on the 7th; the absolute minimum ,, was 29in·060 on the 11th.
The fourth maximum .. was 29in·546 on the 12th; the fourth minimum ,, was 29in·417 on the 13th.
The fifth maximum .. was 29in·780 on the 15th; the fifth minimum ,, was 29in·484 on the 17th.
The absolute maximum .. was 30in·159 on the 25th; the sixth minimum ,, was 30in·057 on the 27th.
The seventh maximum .. was 30in·109 on the 29th; the seventh minimum ,, was 29in·990 on the 30th.
The range in the month was 1in·099.
The mean for the month was 29in·756, being 0in·060 *higher* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 72°·2 on the 6th; the lowest was 34°·5 on the 31st.
The range ,, was 37°·7.
The mean ,, of all the highest daily readings was 59°·7, being 1°·3 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 47°·0, being 3°·3 *higher* than the average of the preceding 35 years.
The mean daily range was 12°·7, being 2°·0 *less* than the average of the preceding 35 years.
The mean for the month was 52°·8, being 2°·6 *higher* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Oct. 1	o	o	10, r : 10	8, cu.-s, ci : 1, ci
2	o	o	v : 6, ci, ci.-s	10 : 10, sh.-r : 9, ci.-cu, cu.-s
3	o	o	9 : 10, cu.-s, ci.-cu	8,cu.-s,cu,ci.-cu,li.-cl : 8,cu.-s,ci.-cu,sl.-r : 9
4	o	o	9 : 9, ci.-cu, ci.-s, shs.-r	v, cu.-s, cu, ci : v, cu.-s, cu
5	o	o	v : 7, ci.-cu	8, cu.-s, ci.-cu : vv, l : vv, cu.-s, ci
6	o	o	v : 10, cu.-s, ci.-cu, sl.-r	v, cu.-s, ci : 4, ci.-cu
7	o : ssP,ssN,g.-cur,sp	o	v : 9, r	9, cu.-s, cu, ci.-cu : 10, sl.-r, cu.-s, cu
8	o	o	10, cu.-s : 10, r	10, oc.-r : 10, sl.-r : v, lu.-co
9	o	o	v : 10, oc.-shs	v, cu.-s, ci, ci.-cu, sl.-r, w : 7
10	o	o	9 : 10, r : 10, r	10, r : vv
11	o	o	vv : 10, r : v, sh.-r	10, r : o
12	o	o	o : 3, ci, ci.-cu, cu	8, ci.-cu, cu.-s : 10, h.-r
13	o	o	10 : 10	10, sl.-r : v, l : 2, ci.-cu
14	o	o	v : 6, r, cu, ci	9, th.-r, cu.-s, cu : o, m
15	o	o	o, h.-d : 1, ci.-cu	2, th.-cl : o, ms
16	o	o	o : 4, ci, ci.-cu	7, ci.-cu, cu.-s : o, ms
17	o	o	o, m : v : v, ci, ci.-cu	4, ci, ci.-cu : v, ms
18	o	o	v : o, f : 3, ci, ci.-cu	7, cu, ci, so.-ha : v, cu, ci
19	o	o	v : 4, li.-cl, th.-f	1, ci.-s : v : 10
20	o	o	10 : 10 : 10, oc.-th.-r	10 : 10
21	o	o	10 : 10	8, ci.-cu, cu.-s : v, ci.-cu, cu.-s : 10
22	o	o	10 : 10 : 10, th.-r	10, th.-r : 10, th.-r
23	o	o	10, th.-r : 10, th.-r	10, th.-r : 10, th.-r
24	o	o	10, th.-r : 10 : 10, sl.-f	10, sl.-f : 10, sl.-f
25	o	o	sl.-f : f : v, f	10, f : 10 : 9
26	o	o	10 : 10, f	10 : 10
27	o	o	10 : 9	10 : 10
28	o	o	10 : 10	10 : 10
29	o	o	10 : 10, f, h, th.-cl	9, ci, ci.-cu, h : v, ci.-cu, lu.-co : v, ci.-cu
30	o	o	v : 2, cu.-s, ci.-cu	8, cu.-s, ci : 9, cu.-s, ci : 9, cu.-s
31	o	o	v : li.-cl	2,cu.-s,cu,li.-cl : 1, cu.-s, cu : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $48^{\circ}\cdot0$, being $1^{\circ}\cdot8$ *higher* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot335$, being $0^{in}\cdot019$ *greater* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $3^{grs}\cdot8$, being $0^{gr}\cdot2$ *greater* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 84 (that of Saturation being represented by 100), being 3 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 537 grains, being 2 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was $7\cdot5$.

WIND.

The proportions were of N. 6, S. 11, W. 5, E. 9, and Calm 0. The greatest pressure in the month was $10^{lbs}\cdot0$ on the square foot on the 9th. The mean daily horizontal movement of the air for the month was 240 miles; the greatest, 543 miles on the 9th; and the least, 84 miles on the 24th and 26th.

RAIN.

Fell on 12 days in the month, amounting to $1^{in}\cdot61$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{in}\cdot21$ *less* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9^h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	Osler's. General Direction. P.M.	Osler's. Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Nov. 1	Full	30·140	47·1	32·4	39·8	32·9	77·0	26·0	52·1	48·3	6·9	11·8	3·9	− 6·4	N	N : NNW	1·0	0·0	0·2	285	0·00
2	..	30·149	47·6	30·8	39·8	35·2	61·0	25·4	50·8	47·3	4·6	8·4	2·3	− 6·2	WSW	WNW : WSW	0·1	0·0	0·0	254	0·00
3	..	30·052	51·0	36·7	45·3	41·3	59·5	31·0	49·7	47·1	4·0	6·3	1·2	− 0·5	WSW	WSW	0·3	0·0	0·0	247	0·14
4	..	30·131	54·1	46·0	50·1	47·3	59·0	44·8	49·3	46·3	2·8	4·8	0·4	+ 4·5	W : NNW	N : E : ESE	0·0	0·0	0·0	153	0·06
5	Perigee Greatest Dec. N.	30·086	51·2	45·2	48·0	47·2	55·0	45·0	49·3	46·6	0·8	4·0	0·0	+ 2·6	SE : S : SW	WSW : W	0·0	0·0	0·0	129	0·03
6	..	30·058	50·9	38·6	45·5	41·0	61·4	31·9	49·5	46·8	4·5	8·4	1·6	+ 0·4	NW : NNW : N	N	0·8	0·0	0·0	263	0·00
7	..	29·993	47·2	32·7	39·5	34·4	83·3	26·5	49·6	46·8	5·1	10·9	2·0	− 5·2	N	N : NNW	1·3	0·0	0·1	291	0·00
8	Last Qr.	29·848	43·6	29·8	36·5	31·3	72·5	23·0	48·8	45·8	5·2	10·3	0·0	− 7·8	NNW	N	2·5	0·0	0·1	272	0·00
9	..	29·822	42·2	30·5	35·0	31·3	75·8	22·9	47·5	45·3	3·7	9·9	0·7	− 8·9	NNE	NNE : N	0·3	0·0	0·0	205	0·02
10	..	30·001	37·0	25·5	31·2	28·3	43·3	22·2	47·1	44·3	2·9	5·8	0·0	−12·3	N	SW : E	0·0	0·0	0·0	128	0·00
11	In Equator	29·729	41·1	27·6	34·3	24·6	87·0	21·6	46·5	43·7	9·7	13·3	0·0	− 8·9	SSE : SE	ESE	3·7	0·0	0·4	303	0·00
12	..	29·070	44·1	33·2	39·4	39·4	44·1	30·5	45·5	42·5	0·0	0·9	0·0	− 3·5	ESE	E	4·2	0·0	0·3	372	0·80
13	..	29·369	47·2	42·7	44·6	43·4	52·8	42·4	44·5	41·8	1·2	2·7	0·4	+ 1·9	NE : N : NW : WSW	ENE : E : SE	0·3	0·0	0·0	151	0·08
14	..	29·370	63·3	44·2	54·6	50·0	97·1	41·0	44·8	41·8	4·6	9·5	0·0	+12·1	E : SE	SSE : S	1·4	0·0	0·0	187	0·00
15	..	29·380	58·8	49·0	53·6	50·9	86·2	42·6	45·3	42·3	2·7	6·5	0·6	+11·3	S : SW	SSW : E : ENE	0·5	0·0	0·0	188	0·20
16	New	29·284	62·0	49·9	55·9	50·0	91·5	48·2	46·1	43·3	5·9	11·4	0·0	+13·7	E : SE : S : SSW	S : SSE	2·7	0·0	0·3	312	0·13
17	..	29·733	56·2	46·8	50·6	44·7	81·8	39·6	47·1	44·3	5·9	10·0	1·9	+ 8·6	S : WSW	WSW : SW : SSW	0·1	0·0	0·0	292	0·00
18	Greatest Declination S.	29·816	55·3	45·2	51·3	50·5	66·6	39·5	47·5	45·3	0·8	4·0	0·0	+ 9·4	S	SSE : S : SSW	0·4	0·0	0·0	275	0·25
19	..	29·602	54·6	45·5	48·9	43·7	86·0	41·4	48·1	45·8	5·2	8·0	2·7	+ 7·1	SW : WSW	SW : WSW	1·3	0·0	0·1	351	0·00
20	..	29·607	49·0	42·3	45·0	41·5	53·5	37·3	48·7	46·5	3·5	6·3	2·6	+ 3·3	WSW : W : WNW	N	2·5	0·0	0·1	350	0·01
21	Apogee	29·931	48·5	42·0	45·0	43·3	52·4	36·8	48·5	46·3	1·7	3·8	1·0	+ 3·3	N	NNE : E : SE	0·0	0·0	0·0	148	0·00
22	..	30·078	43·0	36·4	39·5	34·0	49·3	30·8	48·5	46·5	5·5	7·6	1·6	− 2·2	ESE : E	ESE : SE	0·0	0·0	0·0	146	0·00
23	..	29·949	39·2	36·7	37·9	31·7	44·2	36·5	48·3	46·5	6·2	7·4	4·8	− 3·8	ESE : SE	SE : ESE	0·5	0·0	0·0	204	0·00
24	First Qr.	29·742	42·2	37·7	40·3	37·1	50·8	35·2	47·7	46·1	3·2	5·7	0·9	− 1·3	ESE	ESE	0·0	0·0	0·0	157	0·13
25	..	29·287	56·1	41·7	48·6	43·7	71·0	41·2	47·1	45·5	4·9	8·9	1·3	+ 7·0	ESE : SE	SSW : SW	4·1	0·0	0·5	377	0·16
26	In Equator	29·491	54·8	39·7	47·5	43·5	85·8	32·4	47·3	45·3	4·0	8·6	1·4	+ 5·9	SW : SSW	SSW	2·0	0·0	0·1	326	0·00
27	..	29·118	49·0	44·9	46·7	44·7	54·5	40·0	47·5	45·3	2·0	2·7	1·1	+ 5·1	SSW : S	SSW : S	0·0	0·0	0·0	212	0·51
28	..	29·319	47·2	37·7	41·8	36·0	73·5	32·4	47·3	45·3	5·8	9·2	3·0	+ 0·2	NW : WNW : WSW	WSW : SW : SSW	2·0	0·0	0·3	381	0·26
29	..	29·422	46·4	35·3	40·3	35·2	71·8	29·0	46·3	44·5	5·1	10·5	2·1	− 1·4	WSW	W : SW : SSW	0·5	0·0	0·0	301	0·04
30	..	29·479	48·7	34·1	42·5	41·4	65·0	29·0	45·5	43·3	1·1	4·2	0·0	+ 0·7	SSW : ESE : SE	SE : ESE	0·5	0·0	0·0	184	0·24
Means	..	29·702	49·3	38·7	44·0	40·0	67·1	34·2	47·7	45·2	4·0	7·4	1·2	+ 1·0	...	...	..	..	..	Sum 7444	Sum 3·06

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $30^{\text{in}}\cdot170$ on the 1st; the first minimum in the month was $30^{\text{in}}\cdot014$ on the 3rd.
The absolute maximum ,, was $30^{\text{in}}\cdot206$ on the 4th; the second minimum ,, was $29^{\text{in}}\cdot782$ on the 8th.
The third maximum ,, was $30^{\text{in}}\cdot026$ on the 10th; the absolute minimum ,, was $28^{\text{in}}\cdot988$ on the 12th.
The fourth maximum ,, was $29^{\text{in}}\cdot451$ on the 13th; the fourth minimum ,, was $29^{\text{in}}\cdot248$ on the 16th.
The fifth maximum ,, was $29^{\text{in}}\cdot912$ on the 18th; the fifth minimum ,, was $29^{\text{in}}\cdot552$ on the 19th.
The sixth maximum ,, was $30^{\text{in}}\cdot098$ on the 22nd; the sixth minimum ,, was $29^{\text{in}}\cdot194$ on the 25th.
The seventh maximum ,, was $29^{\text{in}}\cdot529$ on the 26th; the seventh minimum ,, was $29^{\text{in}}\cdot048$ on the 27th.
The eighth maximum ,, was $29^{\text{in}}\cdot542$ on the 30th.
The range in the month was $1^{\text{in}}\cdot218$.
The mean for the month was $29^{\text{in}}\cdot702$, being $0^{\text{in}}\cdot049$ *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 63°·3 on the 14th; the lowest was 25°·5 on the 10th.
The range ,, was 37°·8.
The mean ,, of all the highest daily readings was 49°·3, being 0°·4 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 38°·7, being 1°·4 *higher* than the average of the preceding 35 years.
The mean daily range was 10°·6, being 0°·9 *less* than the average of the preceding 35 years.
The mean for the month was 44°·0, being 1°·1 *higher* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Nov. 1	o	o	o : 1, ci	1, ci : o, mt
2	o : w	o	o, mt : f : th.-cl, h, f	7, li.-cl, h : v, h, lu.-ha : ci.-cu, f
3	o	o	f : 10, sl.-f	10 : 10 : 10, h.-r
4	o	o	10, r : 10 : 10	10 : 10, th.-r
5	o	o	10 : 10, sl.-r, f, glm	10, f : 10, f
6	o	o	10 : 10	9, cu.-s, ci.-cu : 4, li.-cl : li.-cl
7	o	o	o : o, h.-d, h.-fr	5, cu.-s, cu, ci : 1 : o
8	o	s, g.-cur : o	o : 1, ci, h.-fr	v, sn, sl.-r : 9, sl : 9
9	o	o	10 : 9, sl.-sn	3, ci.-cu : 1, ci.-cu : o
10	o	o	o : v : 10	10, f : v, f : o, f, h.-fr
11	o	o	v : 3, ci, ci.-s, h.-fr, so.-ha	v, li.-cl, ci : 10
12	o	o	10, r : 10, r : 10, th.-r	10, th.-r : 10, oc.-r : 10, r
13	o	o	10, r : 10, r, f	10, r : 10, r
14	o	o	10 : v, f : 2, ci	7, ci, ci.-cu : 7, ci.-cu : v, ms
15	o	o	v, ms, r : 10, r	v, cu.-s, ci : vv, cu.-s
16	o	o	10, r : 10 : v, cu.-s, th.-r	2, ci.-s : 1, ci.-s : o
17	o	o	v : 7, ci.-s, cu, cu.-s, so.-ha	v, ci.-cu, cu, cu.-s : o, ms
18	o	o	v : 8	10, r : 10, th.-r : 10, h.-r
19	o	w	v : v, ci	v, cu.-s, cu, ci : vv, cu.-s, cu
20	o	o	vv, cu.-s, cu : 9, cu.-s, cu, ci, r	10, oc.-r : v : v, m
21	o	o	v : 10	10, f : 10 : 10, th.-r
22	o	o	10 : 10	10 : 10
23	o	o	10 : 10	10 : 10
24	o	sN, g.-cur : o	10 : 10	9, r : v, oc.-sl.-r
25	o	o	10 : 10, r	10 : 9
26	o	o	v : v, ci.-cu, ci	v, ci.-cu, cu.-s, sc, oc.-th.-r
27	o	o	v : 10, r	10, r : 10, r
28	o	o	10, h.-r : v : 2, ci.-cu, ci	2, cu, ci : v : v, lu.-ha, oc.-r
29	o	o	10 : v : o, h	2, ci, h : 2, ci : 2, ci, d, lu.-ha
30	o	o	v : 10, f, r	v,cu.-s,cu,ci.-cu : 8, cu.-s, cu : 10, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $40^{\circ}\cdot 0$, being $0^{\circ}\cdot 5$ *higher* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 247$, being $0^{in}\cdot 002$ *greater* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot 8$, being *the same as* the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 85 (that of Saturation being represented by 100), being 3 *less* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 546 grains, being 2 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was $7\cdot 0$.

WIND.

The proportions were of N. 7, S. 10, W. 6, E. 7, and Calm 0. The greatest pressure in the month was $4^{lbs}\cdot 2$ on the square foot on the 12th. The mean daily horizontal movement of the air for the month was 248 miles; the greatest, 381 miles on the 28th; and the least, 128 miles on the 10th.

RAIN.

Fell on 16 days in the month, amounting to $3^{in}\cdot 06$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 73$ *greater* than the average fall of the preceding 61 years.

MONTH and DAY, 1876.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Mean Daily Value.	Of the Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Dec. 1	Full	29·224	56·0	43·5	50·9	47·6	73·5	43·0	45·3	43·1	3·3	6·5	1·8	+ 9·2	SE : SSW	SSW : S : SW	15·1	0·0	0·3	365	0·28
2	Greatest Declination N	29·128	55·5	49·1	52·3	49·6	60·2	46·4	46·3	43·5	2·7	4·8	2·0	+10·4	WSW : SW	SE : SSE	12·0	0·0	0·9	380	0·36
3	Perigee	28·843	56·2	49·5	52·9	47·2	67·0	45·0	46·5	44·3	5·7	7·4	4·0	+11·0	S	SSW : S : SE	4·5	0·0	0·7	447	0·05
4	..	28·407	52·7	47·5	48·9	44·5	54·0	43·0	47·7	45·3	4·4	6·3	2·1	+ 7·0	ESE : S	SW	12·3	0·0	2·2	702	0·46
5	..	28·604	51·7	47·0	49·7	46·8	53·4	42·2	48·3	45·7	2·9	4·2	1·7	+ 7·9	SSW : S	SSE : SSW	7·3	0·0	1·0	522	0·39
6	..	28·998	52·8	44·5	48·3	42·6	80·0	39·0	49·3	46·7	5·7	9·7	2·7	+ 6·6	SW	SW : SSW	3·7	0·0	0·2	403	0·00
7	..	28·978	50·4	44·5	47·3	46·1	54·0	39·8	49·3	46·8	1·2	2·1	0·4	+ 5·8	SE : E	E : SE : S	0·7	0·0	0·0	204	0·25
8	Last Quarter: In Equator.	29·512	48·0	41·0	45·2	41·5	52·6	37·5	48·1	45·7	3·7	6·6	0·9	+ 3·9	NNE : N	N : NNW : NW	1·8	0·0	0·1	306	0·25
9	..	29·974	44·9	35·9	40·4	38·9	48·2	31·3	47·7	45·5	1·5	4·0	0·7	− 0·7	NW : WSW	WNW : WSW	0·0	0·0	0·0	200	0·00
10	..	30·004	46·4	41·1	43·8	38·5	49·0	36·9	45·8	44·1	5·3	8·4	1·8	+ 2·9	WSW	WSW : SW	0·0	0·0	0·0	138	0·00
11	..	29·898	46·0	40·6	43·5	38·0	48·7	39·3	45·1	43·3	5·5	6·8	5·1	+ 2·8	S	SSW	0·0	0·0	0·0	149	0·00
12	..	29·498	46·8	41·0	43·8	41·9	56·5	36·0	44·7	43·1	1·9	2·9	1·5	+ 3·3	SSW : S	SSW : WSW	2·5	0·0	0·2	352	0·19
13	..	29·644	46·7	35·0	40·3	37·5	73·5	30·0	44·1	42·7	2·8	7·1	0·5	− 0·3	WSW	SW : SSE	0·0	0·0	0·0	202	0·00
14	..	29·752	43·7	35·6	40·7	37·0	47·8	30·5	43·3	41·5	3·7	5·5	0·5	0·0	SE	ESE	0·0	0·0	0·0	155	0·00
15	New	29·691	43·8	39·7	42·5	40·5	47·0	37·9	43·1	40·3	2·0	3·3	0·7	+ 1·8	ESE	ESE	0·3	0·0	0·0	214	0·00
16	Greatest Declination S.	29·626	45·0	38·5	42·6	41·1	52·8	34·9	42·5	40·8	1·5	3·5	0·5	+ 1·9	SE	ESE : SE	0·3	0·0	0·0	219	0·05
17	..	29·483	45·0	40·0	42·8	40·0	54·8	39·0	42·5	40·8	2·8	4·4	1·5	+ 2·3	SE : ESE	ESE	0·0	0·0	0·0	199	0·01
18	Apogee	29·079	48·5	39·4	43·4	42·0	71·1	35·5	42·8	41·3	1·4	4·2	0·4	+ 3·2	ESE : E	SSW : SSE : E	0·0	0·0	0·0	118	0·30
19	..	28·886	45·1	40·3	42·4	40·7	55·0	35·0	43·5	41·8	1·7	3·1	0·2	+ 2·4	Variable	SE	0·4	0·0	0·0	144	0·07
20	..	28·609	45·3	40·5	42·2	40·1	47·6	37·2	44·1	42·3	2·1	2·9	0·9	+ 2·5	S : SSW	SE : S	2·8	0·0	0·1	299	0·86
21	..	28·694	45·0	33·0	39·0	35·9	64·9	29·0	44·3	42·8	3·1	5·7	1·5	− 0·3	SW	SSW	4·8	0·0	0·6	313	0·00
22	..	29·034	40·9	29·0	35·4	33·7	55·8	22·0	44·3	42·8	1·7	4·6	0·8	− 3·4	SSW : SW	WSW : SW	0·3	0·0	0·0	193	0·00
23	In Equator First Quarter	29·178	37·9	28·3	33·8	31·7	38·5	20·3	43·1	41·3	2·1	4·9	0·0	− 4·6	S : E : NE	ENE : NE : NNE	1·2	0·0	0·0	205	0·95
24	..	29·329	36·1	32·0	34·0	33·4	36·1	31·5	41·3	38·8	0·6	1·5	0·0	− 4·2	N : NW : WSW	NNW : SW	0·0	0·0	0·0	116	0·54
25	..	29·654	37·8	32·2	35·1	33·0	49·0	32·0	40·3	37·3	2·1	3·6	1·0	− 2·9	ENE	NE : NNE	1·8	0·0	0·1	316	0·05
26	..	29·963	35·0	30·7	33·1	29·3	42·8	30·4	38·5	36·3	3·8	5·9	1·1	− 4·7	NE : ENE	ESE : SE	0·5	0·0	0·0	254	0·09
27	..	29·542	55·2	34·9	47·1	46·1	55·2	32·8	37·3	35·8	1·0	3·0	0·0	+ 9·5	SSE : S	SSW : SW	11·0	0·0	1·6	594	0·16
28	..	29·516	55·0	50·3	52·4	50·3	56·2	47·1	39·3	36·3	2·1	2·6	0·8	+14·9	SW	SSW : SW	11·2	0·0	0·9	510	0·08
29	..	29·500	54·4	47·9	51·2	48·4	57·5	40·2	39·8	37·3	2·8	7·8	0·0	+13·8	SW : WSW : SSW	S : SW	14·5	0·0	1·6	459	0·17
30	Greatest Dec. N: Full.	29·289	54·9	44·7	50·3	46·5	60·2	39·0	41·3	38·8	3·8	10·6	1·9	+13·0	SW : S	SSW : SW	5·2	0·0	1·2	536	0·14
31	Perigee	29·095	55·5	48·1	52·3	46·5	75·7	44·2	42·7	40·3	5·8	10·0	1·3	+15·1	S : SSW	SW	13·0	0·0	1·6	615	0·06
Means	..	29·311	47·7	40·2	44·1	41·2	56·1	36·4	43·9	41·8	2·9	5·3	1·2	+ 4·2	...	...	..	..	..	Sum 9829	Sum 5·76

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 28in·768 on the 5th; the absolute minimum in the month was 28in·251 on the 4th.
The second maximum ,, was 29in·124 on the 6th; the second minimum ,, was 28in·479 on the 5th.
The absolute maximum ,, was 30in·030 on the 10th; the third minimum ,, was 28in·958 on the 7th.
The fourth maximum ,, was 29in·771 on the 14th; the fourth minimum ,, was 29in·445 on the 12th.
The fifth maximum ,, was 30in·008 on the 26th; the fifth minimum ,, was 28in·545 on the 20th.
The sixth maximum ,, was 29in·651 on the 29th; the sixth minimum ,, was 29in·498 on the 28th.
The seventh maximum ,, was 29in·381 on the 30th; the seventh minimum ,, was 29in·259 on the 29th.
The eighth maximum ,, was 29in·323 on the 30th; the eighth minimum ,, was 29in·184 on the 30th.
The range in the month was 1in·779.
The mean for the month was 29in·311, being 0in·491 *lower* than the average of the preceding 35 years.

TEMPERATURE OF THE AIR.

The highest in the month was 56°·2 on the 3rd; the lowest was 28°·3 on the 23rd.
The range ,, was 27°·9.
The mean ,, of all the highest daily readings was 47°·7, being 3°·1 *higher* than the average of the preceding 35 years.
The mean ,, of all the lowest daily readings was 40°·2, being 5°·0 *higher* than the average of the preceding 35 years.
The mean daily range was 7°·5, being 1°·9 *less* than the average of the preceding 35 years.
The mean for the month was 44°·1, being 4°·0 *higher* than the average of the preceding 35 years.

MONTH and DAY, 1876.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Dec. 1	o	o	10, r : v : v, cu.-s, ci	9, cu.-s, cu : 10, r : 10, r
2	o	o	10, w : 10	10, r : 9, ci.-cu, cu.-s, lu.-co
3	o	o	10 : 10, sl.-r	9, cu, ci : v, cu.-s, ci, sl.-r: 10, r
4	o	o	10, r : 10, r, w	10, r, w : vv, cu.-s, cu, lu.-ha
5	o	o	10 : 10, sl.-r	10, r : v, cu.-s, cu, r
6	o	o	v : 3, ci, cu, cu.-s	v,cu.-s,ci,sh.-r: o : ci, ms
7	o	o	v : 10, r : 10, r	10, r : 10, oc.-r
8	o	o	10, r : 10, th.-r	10, ci.-cu, cu.-s : v : o, m
9	o	o	o : 1, ci, h.-fr	v, h. cu.-s, ci.-cu : 7, cu.-s, ci.-cu
10	o : o : w	w : o	7 : 8, h, sl.-f	10, h : 10 : 10
11	o	o	10 : 10	10,sl.-r,cu.-s,ci.-cu: 10 : 10
12	o	o	10 : 10, th.-r	10, r : o
13	o	o	o : o, h.-fr, f	o : o, m : o, d, ms
14	o	o	o : v : 10	10 : 10
15	o	o	10 : 10	10 : 10, th.-r
16	o	o	10 : 9, sl.-r	10, r : 10, r
17	o	o	10 : 10	10 : 10, r
18	o	o	10, r : 10, r	7, th.-r, cu.-s : v, cu.-s, sl.-r : v
19	o	o	10 : 10, gt.-glm	9, ci.-s, th.-cl : 10, th.-r : 10, r
20	o : o : wN	o	10, r : 10, h.-r	v, ci.-cu, cu.-s, r : 10, h.-r
21	o	o	v : v, ci.-cu, cu.-s, ci	7, ci.-cu, ci : 2, ci.-cu, ci : o
22	o	o	v : v, ci.-cu, f	v, glm, hl : v : v, h.-fr
23	o	o	v : 10, sh.-hl	10, th.-r : 10, r, sn : 10, h.-r
24	o	o	10, h.-r : 10, r, glm	10, th.-f : 10, sl.-f
25	o	o	10 : 10, r, sl.-sn	10 : 10, sl.-r
26	o	o	10 : 10, th.-cl	10, cu.-s : 10 : 10, r
27			10, r : 10 : 10, r	10, r : 10, oc.-th.-r
28			10 : 10	10, th.-r : 10, lu.-ha
29			10 : 10, sl.-r	10, r : 10, th.-r, w
30			10 : 10	10, cu.-s, ci.-cu, r : vv, ci.-cu
31			vv : v, w, r : vv, sl.-r, ci.-cu	vv,ci.-cu,cu.-s,w: vv, ci.-cu, cu.-s : 10, sl.-r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 41°·2, being 4°·5 *higher* than the average of the preceding 35 years.

Elastic Force of Vapour.—The mean for the month was 0in·259, being 0in·038 *greater* than the average of the preceding 35 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2grs·9, being 0gr·3 *greater* than the average of the preceding 35 years.

Degree of Humidity.—The mean for the month was 90 (that of Saturation being represented by 100), being 2 *greater* than the average of the preceding 35 years.

Weight of a Cubic Foot of Air.—The mean for the month was 539 grains, being 13 grains *less* than the average of the preceding 35 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 8·1.

WIND.

The proportions were of N. 3, S. 14, W. 7, E. 7, and Calm 0. The greatest pressure in the month was 15lbs·1 on the square foot on the 1st. The mean daily horizontal movement of the air for the month was 317 miles; the greatest 702 miles on the 4th; and the least 116 miles on the 24th.

RAIN.

Fell on 22 days in the month, amounting to 5in·76, as measured in the simple cylinder gauge partly sunk below the ground; being 3in·80 *greater* than the average fall of the preceeding 61 years.

ELECTRICITY.

From December 27 to 31, the insulating lamp was not burning.

The following table contains the highest and lowest readings of the Barometer, reduced to 32° Fahrenheit, extracted from the photographic records. The readings are accurate, but the times are liable to some uncertainty. The time given is the middle of the stationary period. The symbol : denotes that the mercury has been sensibly stationary through a period of more than one hour. The readings from June 21. $3^h. 0^m.$, to July 7. $21^h. 0^m.$, both inclusive, are taken from the eye-observations, owing to temporary interruption of the photographic registration.

MAXIMA.			MINIMA.			MAXIMA.			MINIMA.		
Approximate Mean Solar Time, 1876.		Reading.	Approximate Mean Solar Time, 1876.		Reading.	Approximate Mean Solar Time, 1876.		Reading.	Approximate Mean Solar Time, 1876.		Reading.
	d h m	in.		d h m	in.		d h m	in.		d h m	in.
January	1. 22. 0	30·024	January	1. 0. 15	29·810	April	12. 7. 45	29·800	April	10. 4. 50	29·058
	5. 22. 30	30·293		2. 13. 15	29·850		14. 22. 0	30·102		13. 4. 30	29·297
	10. 6. 0	30·172		8. 1. 30	29·840		25. 21. 0	30·021		19. 1. 0	28·740
	11. 14. 0	30·130		11. 1. 15	29·960	May	3. 21. 40	30·320		28. 0. 30	29·320
	14. 22. 0	30·480		12. 12. 0	29·920		7. 21. 50	30·255	May	6. 3. 15	29·985
	18. 10. 45	30·115		17. 18. 0	29·835		12. 21. 0	30·067		11. 5. 0	29·923
	24. 9. 0	30·445		21. 5. 0	29·440		19. 10. 0	30·150		14. 18. 0	29·870
	30. 23. 0	30·276		27. 5. 0	30·118		28. 22. 0	30·059		24. 6. 0	29·495
February	2. 11. 0	30·190	February	1. 16. 20	29·880		31. 20. 50	30·101		30. 17. 0	29·855
	7. 10. 10:	29·812		5. 14. 0	29·650	June	4. 8. 30	29·835	June	3. 10. 0	29·585
	14. 7. 0	29·533		13. 15. 30:	29·338		5. 19. 0	29·880		4. 21. 15	29·680
	16. 11. 10	29·595		15. 2. 30	29·282		10. 10. 0	30·048		8. 22. 0	29·548
	20. 12. 0	29·730		18. 14. 0	29·004		18. 20. 10	30·008		15. 15. 10	29·563
	21. 22. 0	29·726		21. 9. 0	29·593		22. 9. 0	29·818		21. 3. 0	29·694
	24. 8. 30	29·942		22. 18. 50	29·491		27. 9. 0	30·014		24. 3. 0	29·723
	28. 8. 30	29·725		26. 11. 0	29·192	July	2. 21. 0	29·973		29. 3. 0	29·759
	29. 8. 50	29·708		29. 2. 0	29·585		11. 21. 15	30·280	July	7. 21. 0	29·575
March	1. 20. 50	29·680	March	1. 1. 55	29·335		17. 10. 15	30·130		17. 3. 0	30·018
	4. 10. 30	29·655		3. 7. 0	29·490		19. 12. 0	30·055		18. 21. 0	29·904
	6. 10. 0	29·610		5. 19. 0	29·390		24. 22. 20	30·030		22. 16. 45	29·718
	7. 10. 0	29·733		6. 17. 10	29·470		27. 0. [illegible]0	29·885		26. 15. 20	29·745
	11. 9. 30	29·100		9. 12. 0	28·520		29. 11. 0	29·890		28. 6. 0	29·424
	13. 0. 30	29·520		12. 0. 45	28·260	August	1. 11. 0	29·980		31. 1. 50	29·480
	18. 13. 45	29·845		14. 19. 0	29·036		4. 3. 0	29·864	August	2. 21. 0	29·314
	19. 9. 0	29·912		18. 22. 0	29·710		5. 21. 0	30·118		4. 15. 0	29·760
	22. 21. 0	29·770		21. 5. 0	29·670		10. 20. 0	30·187		9. 4. 30	29·868
	30. 2. 0	29·475		28. 5. 0	29·020		15. 18. 30	29·840		14. 4. 0	29·725
April	4. 22. 45	30·332		31. 1. 0	29·380		18. 8. 40	29·828		17. 14. 50	29·705

MAXIMA.

	Approximate Mean Solar Time, 1876.	Reading.
	d h m	in.
August	20. 22. 0	29·740
	25. 10. 15	29·880
	27. 19. 30	29·855
	29. 11. 30:	29·665
September	3. 8. 50	29·835
	5. 8. 0	29·588
	6. 7. 0	29·550
	8. 12. 0	29·643
	11. 23. 0	29·715
	19. 22. 0	30·230
	23. 11. 15	29·780
	25. 9. 0	29·775
	29. 10. 0	29·580
October	1. 22. 0	30·040
	4. 21. 30	29·820
	7. 9. 0	29·800
	11. 23. 50	29·548
	14. 18. 0	29·790
	25. 9. 30	30·162
	28. 22. 0	30·125

MINIMA.

	Approximate Mean Solar Time, 1876.	Reading.
	d h m	in.
August	19. 22. 45	29·550
	23. 5. 30	29·616
	26. 16. 0	29·440
	28. 21. 30	29·495
	31. 2. 0	28·938
September	4. 16. 0	29·375
	5. 19. 0	29·322
	6. 19. 15	29·360
	9. 4. 15	29·545
	16. 5. 0	29·445
	23. 1. 30	29·670
	24. 7. 30	29·388
	28. 6. 0	29·133
	30. 13. 0	29·093
October	3. 17. 50	29·610
	6. 1. 30	29·673
	11. 4. 30	29·045
	12. 18. 0	29·375
	17. 17. 0	29·484
	27. 4. 0	30·045

MAXIMA.

	Approximate Mean Solar Time, 1876.	Reading.
	d h m	in.
November	1. 11. 40	30·200
	4. 10. 40	30·210
	6. 7. 0	30·080
	10. 7. 45:	30·035
	13. 10. 45:	29·451
	15. 3. 0	29·413
	17. 19. 30	29·930
	22. 9. 30	30·105
	25. 21. 40	29·535
	28. 7. 30	29·350
	29. 21. 10	29·550
December	2. 4. 0:	29·155
	4. 16. 10	28·850
	6. 9. 30	29·140
	9. 22. 0	30·033
	14. 11. 50	29·775
	25. 22. 45	30·015
	28. 21. 45	29·665
	29. 15. 15	29·475
	30. 9. 20	29·325

MINIMA.

	Approximate Mean Solar Time, 1876.	Reading.
	d h m	in.
October	30. 3. 40:	29·990
November	3. 14. 15	29·995
	5. 16. 0:	29·985
	8. 18. 40	29·775
	12. 12. 50:	28·955
	14. 18. 0:	29·305
	15. 17. 30:	29·212
	19. 16. 10:	29·505
	25. 0. 30	29·185
	27. 10. 40	29·035
	28. 15. 30	29·285
December	1. 13. 30	28·995
	3. 23. 0	28·240
	5. 2. 30	28·475
	7. 2. 20	28·948
	12. 6. 30	29·415
	20. 14. 15:	28·515
	27. 6. 30	29·475
	29. 8. 30	29·240
	30. 3. 50	29·173

ABSOLUTE MAXIMA AND MINIMA READINGS OF THE BAROMETER for each Month in the YEAR 1876.
[Extracted from the preceding Table.]

1876. MONTH.	Readings of the Barometer.		Range of Reading in each Month.
	Maxima.	Minima.	
	in.	in.	in.
January	30·480	29·440	1·040
February	30·190	29·004	1·186
March	29·912	28·260	1·652
April	30·332	28·740	1·592
May	30·320	29·495	0·825
June	30·048	29·548	0·500
July	30·280	29·424	0·856
August	30·187	28·938	1·249
September	30·230	29·093	1·137
October	30·162	29·045	1·117
November	30·210	28·955	1·255
December	30·033	28·240	1·793

The highest reading in the year was 30in·480 on January 15. The lowest reading in the year was 28in·240 on December 4.
The range of reading in the year was 2in·240.

MONTHLY MEANS of RESULTS for METEOROLOGICAL ELEMENTS.

1876, MONTH.	Mean Reading of the Barometer.	Temperature of the Air. Highest.	Lowest.	Range in the Month.	Mean of all the Highest.	Mean of all the Lowest.	Mean Daily Range.	Mean Temperature.	Mean Temperature of Dew Point.	Mean Elastic Force of Vapour.	Mean Weight of Vapour in a Cubic Foot of Air.	Mean additional Weight required to saturate a Cubic Foot of Air.
	in.	°	°	°	°	°	°	°	°	in.	grs.	gr.
January ..	30·095	56·1	17·4	38·7	42·7	31·1	11·6	37·0	33·1	0·188	2·2	0·4
February..	29·627	59·0	21·8	37·2	46·6	36·2	10·4	41·1	36·5	0·216	2·5	0·5
March	29·391	64·7	25·5	39·2	49·1	35·0	14·1	41·1	35·0	0·204	2·4	0·7
April	29·680	70·2	29·2	41·0	57·7	39·6	18·1	47·2	40·5	0·252	2·9	0·8
May	29·956	73·6	31·5	42·1	61·6	39·2	22·4	49·4	40·5	0·252	2·9	1·2
June	29·816	83·9	40·1	43·8	71·2	48·8	22·4	58·5	49·6	0·356	4·0	1·7
July......	29·902	94·0	44·7	49·3	80·0	55·1	24·9	65·9	55·7	0·444	4·9	2·1
August ...	29·768	93·8	41·1	52·7	76·8	53·4	23·4	63·7	53·2	0·406	4·5	2·0
September.	29·620	72·5	41·6	30·9	65·7	48·6	17·1	55·8	50·0	0·361	4·1	0·9
October ...	29·756	72·2	34·5	37·7	59·7	47·0	12·7	52·8	48·0	0·335	3·8	0·7
November .	29·702	63·3	25·5	37·8	49·3	38·7	10·6	44·0	40·0	0·247	2·8	0·5
December .	29·311	56·2	28·3	27·9	47·7	40·2	7·5	44·1	41·2	0·259	2·9	0·4
Means	29·719	Highest. 94·0	Lowest. 17·4	Annual Range. 76·6	59·0	42·7	16·3	50·1	43·6	0·293	3·3	1·0

1876, MONTH.	Mean Degree of Humidity. (Saturation = 100.)	Mean Weight of a Cubic Foot of Air.	Mean Amount of Cloud. (0–10.)	Rain. Number of Rainy Days.	Amount collected on the Ground. Gauge read Daily.	Gauge read Monthly.	Wind. From Osler's Anemometer. Number of Hours of Prevalence of each Wind, referred to different Points of Azimuth. N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Number of Calm or nearly Calm Hours.	Mean Daily Pressure in lbs. on the Square Foot.	From Robinson's Anemometer. Mean Daily Horizontal Movement of the Air in Miles.
		grs.			in.	in.											
January.........	86	562	7·6	13	1·11	1·10	81	136	78	105	154	138	39	13	0	0·37	278
February........	84	548	7·5	19	1·50	1·60	105	38	24	57	58	263	132	19	0	1·00	375
March	79	544	6·5	18	2·32	2·53	70	44	60	36	71	213	209	41	0	0·93	429
April...........	78	542	6·2	9	1·27	1·37	60	81	86	44	115	195	121	18	0	0·35	318
May............	71	545	5·2	5	1·13	1·09	164	220	141	21	15	78	77	28	0	0·25	279
June............	73	532	6·5	10	1·08	1·00	136	96	90	39	59	166	99	35	0	0·16	235
July............	70	526	5·5	8	0·67	0·64	121	46	76	38	43	227	151	42	0	0·10	240
August	69	526	5·1	13	2·01	1·70	84	59	131	26	36	236	133	39	0	0·23	263
September.......	81	531	6·6	22	2·58	2·66	52	16	36	67	65	205	201	78	0	0·23	272
October.........	84	537	7·5	12	1·61	1·71	49	152	83	135	115	165	32	13	0	0·15	240
November	85	546	7·0	16	3·06	3·03	145	19	68	140	105	125	84	34	0	0·08	248
December	90	539	8·1	22	5·76	5·82	24	42	89	123	156	250	44	16	0	0·43	317
Sums	..	..	..	167	24·10	24·25	1091	949	962	831	992	2261	1322	376	0	..	..
Means	79	540	6·6	..	..	..	..	..	..	..	..	..	..	..	..	0·36	291

The greatest recorded pressure of the wind on the square foot in the year was 35 lbs. on March 15.
The greatest recorded daily horizontal movement of the air „ „ 869 miles on March 15.
The least recorded daily horizontal movement of the air „ „ 49 miles on February 11.

DAILY DURATION OF SUNSHINE in the Year 1876, as derived from the Records of CAMPBELL'S SELF-REGISTERING INSTRUMENT.

Days of the Month, 1876.	May.	June.	July.	August.	September.	October.	November.	December.
d	h	h	h	h	h	h	h	h
1	..	6·4	2·9	11·9	2·5	0·3	4·2	0·8
2	..	2·5	2·0	10·4	3·2	0·0	0·0	0·0
3	..	2·9	5·0	6·2	5·4	1·2	0·0	0·2
4	..	7·7	0·9	1·5	0·0	4·3	0·0	0·0
5	..	0·0	1·4	8·0	9·0	5·3	0·0	0·0
6	..	0·5	2·6	7·0	7·4	2·4	0·8	3·1
7	7·1	6·6	7·3	12·1	3·4	0·0	0·0	0·0
8	10·9	4·1	4·5	11·4	4·0	0·0	4·2	0·0
9	12·4	0·0	6·6	10·5	1·5	1·9	2·0	0·0
10	11·4	5·9	6·7	10·7	2·5	0·0	0·0	0·0
11	13·6	13·9	2·3	11·1	2·2	1·4	3·6	0·0
12	6·0	5·0	12·7	11·3	1·3	4·7	0·0	0·0
13	7·7	0·0	12·7	12·4	0·0	0·0	0·0	2·0
14	0·0	10·8	13·1	12·2	1·3	1·9	2·3	0·0
15	7·7	5·8	11·4	9·6	4·7	8·3	0·5	0·0
16	7·3	5·7	9·5	7·5	0·0	3·2	3·9	0·0
17	4·8	0·0	11·8	9·2	4·0	4·9	1·5	0·0
18	5·6	11·3	6·7	0·0	9·1	1·4	2·3	0·0
19	8·3	7·8	5·5	3·2	6·1	5·5	0·0	0·0
20	11·4	13·0	12·0	0·7	3·2	0·0	0·0	0·0
21	8·2	13·7	9·4	4·0	7·6	0·6	0·0	0·4
22	2·3	0·6	11·6	1·0	8·3	0·0	0·0	0·0
23	0·9	0·0	2·9	10·1	2·6	0·0	0·0	0·0
24	0·0	5·9	0·0	6·1	1·6	0·0	0·0	0·0
25	0·8	13·7	10·9	9·6	4·9	0·0	0·0	0·0
26	0·0	13·0	13·3	2·4	1·2	0·0	3·7	0·0
27	0·0	12·8	9·0	4·9	0·0	..	0·0	0·0
28	2·5	6·9	0·0	0·0	2·5	..	2·9	0·0
29	7·9	2·5	10·9	7·5	6·6	..	4·0	0·0
30	13·7	5·5	8·7	3·0	0·0	..	0·0	0·0
31	1·8		..	1·4		..		0·0
Total Registered Duration.	152·3	184·5	214·3	216·9	106·1	47·3	35·9	6·5
Greatest Daily Duration..	13·7	13·9	13·3	12·4	9·1	8·3	4·2	3·1
Mean Daily Duration	6·1	6·2	7·1	7·0	3·5	1·8	1·2	0·2
Mean Daily Period during which Sun was above Horizon	15·7	16·5	16·0	14·5	12·6	10·8	8·8	7·8
Proportion of Sunshine (Constant Sunshine = 1)	0·39	0·38	0·44	0·48	0·28	0·17	0·14	0·03

The register was commenced on May 7; on July 31 the register was lost; and from October 27 to 31, the instrument was not in action.
May 30. A small portion of the register on this day was estimated, in consequence of the instrument having been out of adjustment.

TOTAL AMOUNT of SUNSHINE registered in each HOUR of the DAY for each MONTH of Observation in the YEAR 1876, as derived from the

'orresponding aggregate Period uring which e Sun was above Horizon.	Mean Altitude of the Sun at Noon.
h	°
392·6	58
494·5	62
481·4	60
449·1	52
376·9	41
279·8	31
264·4	20
242·7	16

Mickley Lodge
[illegible]

Monday 7th April 1879.

Dear Mr Ellis.

I have to thank you for a letter, I have thanked the Astronomer Royal for two books in one of which I find mention of my optical contrivance and its work since at the Observatory May 7. 1876. In return here is a better and simpler plan for taking daily observations of the times of bright sunshine and also ~~and~~ the power of the sun's heat rays.

Keep your registering sun dial going in the mean time. get for yourselves a good glass ball, the bigger the better. I have got one of cast glass from Phillips in Bond street for 12/6d; the diameter is nearly six inches.

Place the spherical lens with reference to the Horizontal and Equatorial, [illegible] as shewn in the sketch.

as has been shewn experimentally on my bowls since August 1854 when I started them at the Board of Health, ~~Horseguards~~ and lately upon gutta percha cups [illegible]

DAILY DURATION of SUNSHINE in the Year 1876, as derived from the Records of CAMPBELL'S SELF-REGISTERING INSTRUMENT.

Days of the Month, 1876.
d
1
2
3
4
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12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
Total Registered Duratio
Greatest Daily Duration
Mean Daily Duration ..
Mean Daily Period during which Sun was above Horizon ......
Proportion of Sunshine (Constant Sunshine = 1) ....

Sir Richard Airy on the 31st of [illegible] ~~last~~
~~1877~~ the sun's daily path upon a
spherical surface is in a plane nearly
parallel to that of the Equator, and
that plane makes an angle with ~~that~~
the plane of the Horizon of say 38½
hereabouts.
get a slope made at the proper ~~right~~ angle
for the place, say of marble, and
place it East & West. Cut sheets of
card board, or blocks of paper in circles
to fit the burning focus of the glass ball and the season.
Keep well ~~within~~ within ~~them~~ the visual focus, [illegible]
to catch the side pencils (which cross, near the lens [illegible]). Upon these, paper
edges the sun will burn, & shew its
power ~~as well as~~ at the time by the
depth of the mark which can be read in sectors ~~of all substances~~
[illegible] upon ~~sun time scale~~ may be [illegible]
Pressed paper is very di[illegible] to set
on fire. I have just got bits of the
sun's path recorded upon the straight

TOTAL AMOUNT of SUNSHINE registered in each HOUR of the DAY for each MONTH of Observation in the YEAR 1876, as derived from the

'orresponding aggregate Period iring which ie Sun was above Horizon.	Mean Altitude of the Sun at Noon.
h	°
392·6	58
494·5	62
481·4	60
449·1	52
376·9	41
279·8	31
264·4	20
242·7	16

placed as shown in the sketch
edges of books. I send you one.
as this is the first of its kind
please to consider this letter as
a publication so as to prevent
patents and piracy. I am only
a contriver of simple practical
expedients. I only want the credit which
is the reward of an inventor & that
I am safe to get at Greenwich
observatory; but I do not [illegible] any
manufacturer to monopolise
the profits, if there be any, as a patentee.

Please shew this to Sir Richard.
I know that he likes practical
contrivances & this is one. It is
founded upon principles stated in
my letter to him of March 31. The instrument
is worked by the Earth's rotation; & by the sun [illegible]
it may be of use to meteorologists [illegible]

DAILY DURATION of SUNSHINE in the Year 1876, as derived from the Records of CAMPBELL'S SELF-REGISTERING INSTRUMENT.

Days of the Month, 1876.	
d	It is an astronomical instrument which may yet teach a great deal
1	
2	
3	
4	Yours very truly
5	[illegible]
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	Friday, 11th April 1879. Made duplicate observations kept one, & sent the other to Chris a mill board with a sheet of white paper kept upon it, the last of a [illegible]
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
Total Registered Duratio[n]	
Greatest Daily Duration	
Mean Daily Duration ..	
Mean Daily Period during which Sun was above Horizon	
Proportion of Sunshine (Constant Sunshine = 1)	

TOTAL AMOUNT of SUNSHINE registered in each HOUR of the DAY for each MONTH of Observation in the YEAR 1876, as derived from the Records of CAMPBELL'S SELF-REGISTERING INSTRUMENT.

1876, Month.	Number of Days of Observation.	Registered Duration of Sunshine in the Hour ending																Total registered Duration of Sunshine in each Month.	Corresponding aggregate Period during which the Sun was above Horizon.	Mean Altitude of the Sun at Noon.
		5h. a.m.	6h. a.m.	7h. a.m.	8h. a.m.	9h. a.m.	10h. a.m.	11h. a.m.	Noon.	1h. p.m.	2h. p.m.	3h. p.m.	4h. p.m.	5h. p.m.	6h. p.m.	7h. p.m.	8h. p.m.			
		h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	°
May	25	..	3·9	8·0	9·2	7·6	8·9	10·7	12·2	13·6	13·1	13·7	14·7	15·2	13·2	8·3	..	152·3	392·6	58
June	30	0·2	7·1	12·1	13·8	13·9	14·6	15·2	14·6	14·2	16·0	13·9	14·6	12·9	12·1	9·1	0·2	184·5	494·5	62
July	30	..	5·2	11·0	14·5	16·0	18·2	19·4	20·1	17·8	17·9	17·0	16·8	18·6	15·1	6·5	0·2	214·3	481·4	60
August	31	..	3·4	10·7	17·4	19·9	21·4	22·0	17·4	16·7	18·0	19·2	17·2	15·9	14·1	3·6	..	216·9	449·1	52
September ..	30	..	..	1·3	2·7	6·9	10·9	13·5	11·7	11·1	13·7	14·2	9·5	6·7	3·9	..	..	106·1	376·9	41
October	26	..	..	..	1·4	4·0	5·3	6·7	6·2	6·2	7·2	6·5	3·2	0·6	..	..	..	47·3	279·8	31
November ..	30	..	..	..	..	0·2	0·6	4·0	8·2	10·4	8·4	4·1	..	..	..	..	..	35·9	264·4	20
December ..	31	..	..	..	..	..	..	0·8	2·3	1·8	1·6	..	..	..	..	..	..	6·5	242·7	16

The hours are reckoned from apparent noon.

(I.)—Reading of a Thermometer whose bulb is sunk to the depth of 25·6 feet (24 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month. 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	52·66	51·93	51·13	50·33	49·78	49·57	49·68	50·20	51·10	52·04	52·64	52·92
2	52·64	51·88	51·11	50·32	49·77	49·56	49·68	50·23	51·13	52·12	52·65	52·90
3	52·65	51·87	51·10	50·30	49·76	49·55	49·70	50·25	51·16	52·10	52·66	52·90
4	52·60	51·84	51·06	50·29	49·75	49·55	49·72	50·27	51·21	52·15	52·70	52·88
5	52·57	51·80	51·02	50·25	49·74	49·55	49·70	50·30	51·24	52·17	52·70	52·90
6	52·54	51·77	51·00	50·25	49·74	49·55	49·73	50·33	51·27	52·18	52·73	52·90
7	52·50	51·75	50·97	50·23	49·72	49·54	49·74	50·37	51·29	52·22	52·71	52·90
8	52·45	51·72	50·95	50·21	49·70	49·55	49·76	50·39	51·33	52·24	52·71	52·88
9	52·47	51·67	50·88	50·17	49·70	49·55	49·76	50·45	51·35	52·26	52·73	52·87
10	52·44	51·64	50·84	50·15	49·69	49·55	49·78	50·45	51·38	52·26	52·73	52·88
11	52·40	51·62	50·85	50·12	49·68	49·55	49·78	50·48	51·40	52·28	52·74	52·87
12	52·38	51·60	50·80	50·10	49·64	49·57	49·80	50·53	51·44	52·34	52·74	52·85
13	52·37	51·56	50·77	50·07	49·65	49·56	49·82	50·60	51·47	52·34	52·78	52·85
14	52·35	51·55	50·77	50·05	49·64	49·57	49·87	50·58	51·53	52·36	52·83	52·84
15	52·33	51·55	50·74	50·06	49·67	49·57	49·87	50·61	51·55	52·37	52·84	52·85
16	52·27	51·52	50·69	50·03	49·68	49·57	49·87	50·64	51·58	52·40	52·85	52·83
17	52·28	51·50	50·66	50·00	49·63	49·56	49·91	50·65	51·62	52·43	52·85	52·83
18	52·29	51·48	50·64	49·98	49·61	49·58	49·92	50·68	51·64	52·45	52·85	52·80
19	52·25	51·45	50·59	49·98	49·62	49·59	49·93	50·70	51·69	52·47	52·85	52·79
20	52·23	51·45	50·57	49·95	49·62	49·60	49·95	50·74	51·73	52·47	52·85	52·78
21	52·20	51·40	50·55	49·94	49·60	49·62	49·98	50·77	51·75	52·47	52·85	52·77
22	52·15	51·36	50·53	49·94	49·60	49·62	50·00	50·78	51·78	52·49	52·85	52·76
23	52·14	51·34	50·50	49·91	49·56	49·60	50·00	50·83	51·83	52·50	52·84	52·74
24	52·14	51·30	50·50	49·90	49·57	49·62	50·03	50·86	51·83	52·52	52·85	52·74
25	52·08	51·29	50·47	49·89	49·56	49·63	50·05	50·88	51·87	52·53	52·89	52·75
26	52·07	51·25	50·43	49·84	49·56	49·63	50·08	50·92	51·90	52·56	52·88	52·72
27	52·05	51·23	50·40	49·83	49·57	49·65	50·07	50·95	51·94	52·56	52·87	52·74
28	52·00	51·21	50·39	49·83	49·55	49·65	50·12	50·98	51·95	52·59	52·88	52·75
29	51·98	51·19	50·38	49·82	49·57	49·66	50·13	51·02	51·98	52·62	52·87	52·75
30	51·99		50·36	49·80	49·57	49·65	50·18	51·05	51·99	52·63	52·88	52·73
31	51·97		50·35		49·57		50·17	51·07		52·63		52·73
Means.	52·30	51·54	50·71	50·05	49·65	49·59	49·90	50·63	51·56	52·38	52·79	52·82

(II.)—Reading of a Thermometer whose bulb is sunk to the depth of 12·8 feet (12 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month. 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	50·40	48·60	47·40	47·18	47·62	49·08	51·22	54·25	56·43	56·32	55·73	53·64
2	50·39	48·52	47·43	47·18	47·65	49·23	51·34	54·39	56·51	56·32	55·66	53·54
3	50·32	48·54	47·42	47·15	47·71	49·26	51·38	54·47	56·55	56·34	55·65	53·47
4	50·25	48·48	47·42	47·14	47·74	49·23	51·53	54·57	56·58	56·36	55·62	53·36
5	50·20	48·38	47·38	47·12	47·79	49·27	51·60	54·65	56·64	56·33	55·58	53·29
6	50·20	48·36	47·38	47·10	47·87	49·31	51·70	54·76	56·70	56·30	55·49	53·20
7	50·10	48·30	47·40	47·10	47·87	49·37	51·82	54·90	56·63	56·30	55·42	53·14
8	50·00	48·29	47·41	47·10	47·92	49·44	51·92	54·93	56·66	56·28	55·35	53·04
9	50·03	48·20	47·37	47·12	47·97	49·50	51·99	55·08	56·65	56·23	55·27	52·95
10	49·98	48·15	47·38	47·05	48·00	49·55	52·08	55·10	56·64	56·28	55·17	52·93
11	49·90	48·16	47·43	47·06	48·04	49·64	52·19	55·15	56·64	56·19	55·13	52·84
12	49·85	48·12	47·40	47·10	48·06	49·74	52·30	55·23	56·63	56·20	55·05	52·80

(II.)—Reading of a Thermometer whose bulb is sunk to the depth of 12·8 feet (12 French feet) below the surface of the soil, at Noon on every Day—*concluded.*

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
13	49·85	48·10	47·40	47·11	48·10	49·78	52·43	55·24	56·62	56·15	55·03	52·75
14	49·81	48·00	47·43	47·14	48·19	49·85	52·57	55·38	56·68	56·14	54·99	52·69
15	49·75	48·02	47·43	47·20	48·18	49·94	52·67	55·40	56·67	56·12	54·92	52·65
16	49·66	47·92	47·43	47·23	48·24	49·98	52·76	55·49	56·65	56·13	54·86	52·60
17	49·64	47·96	47·42	47·26	48·29	50·05	52·87	55·53	56·68	56·13	54·75	52·55
18	49·61	47·91	47·43	47·30	48·36	50·16	52·93	55·55	56·70	56·11	54·65	52·50
19	49·50	47·80	47·40	47·36	48·39	50·23	53·03	55·63	56·64	56·13	54·55	52·45
20	49·44	47·74	47·42	47·37	48·44	50·35	53·14	55·67	56·70	56·06	54·45	52·36
21	49·35	47·70	47·40	47·38	48·52	50·43	53·23	55·80	56·65	55·98	54·33	52·27
22	49·25	47·66	47·36	47·45	48·53	50·49	53·34	55·80	56·65	55·95	54·23	52·18
23	49·19	47·60	47·40	47·44	48·58	50·52	53·34	55·87	56·60	55·95	54·12	52·11
24	49·14	47·55	47·40	47·48	48·60	50·59	53·46	55·95	56·54	55·94	54·06	52·00
25	49·06	47·56	47·37	47·50	48·64	50·66	53·62	56·01	56·50	55·88	54·06	51·88
26	48·95	47·50	47·34	47·52	48·69	50·80	53·73	56·18	56·51	55·90	53·97	51·78
27	48·95	47·48	47·31	47·51	48·76	50·88	53·77	56·18	56·45	55·88	53·87	51·71
28	48·83	47·45	47·30	47·52	48·82	50·97	53·92	56·26	56·45	55·78	53·80	51·65
29	48·78	47·47	47·28	47·58	48·90	51·03	53·98	56·32	56·38	55·84	53·72	51·62
30	48·75		47·24	47·63	48·92	51·10	54·12	56·40	56·34	55·84	53·67	51·53
31	48·73		47·23		49·00		54·16	56·40		55·75		51·45
Means .	49·61	47·98	47·38	47·28	48·27	50·01	52·71	55·44	56·59	56·10	54·77	52·55

(III.)—Reading of a Thermometer whose bulb is sunk to the depth of 6·4 feet (6 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	47·90	45·80	46·04	45·63	48·85	51·56	56·30	60·50	61·19	58·47	56·10	51·78
2	47·93	45·80	46·16	45·80	48·95	51·73	56·52	60·57	61·09	58·43	55·92	51·61
3	47·90	45·93	46·30	45·93	49·03	51·90	56·70	60·55	60·94	58·41	55·73	51·38
4	47·90	45·97	46·40	46·11	49·04	52·04	56·84	60·55	60·80	58·40	55·52	51·23
5	47·90	45·90	46·50	46·22	49·06	52·22	56·99	60·53	60·71	58·29	55·28	51·31
6	47·90	45·98	46·58	46·40	49·10	52·35	57·18	60·53	60·58	58·20	55·07	51·25
7	47·90	45·97	46·80	46·59	49·10	52·52	57·36	60·58	60·43	58·15	54·88	51·37
8	47·80	45·91	46·77	46·80	49·20	52·68	57·52	60·52	60·40	58·13	54·70	51·32
9	47·77	45·78	46·78	46·99	49·30	52·80	57·67	60·63	60·32	58·12	54·56	51·30
10	47·60	45·62	46·80	47·21	49·40	52·93	57·78	60·62	60·27	58·12	54·33	51·37
11	47·35	45·65	46·88	47·43	49·55	53·10	57·92	60·70	60·20	58·22	54·14	51·33
12	47·20	45·50	46·80	47·62	49·61	53·29	58·10	60·88	60·03	58·31	53·90	51·26
13	47·02	45·40	46·70	47·78	49·71	53·32	58·27	61·05	59·88	58·28	53·70	51·20
14	46·83	45·22	46·64	47·86	49·85	53·45	58·42	61·11	59·81	58·22	53·39	51·12
15	46·67	45·10	46·57	47·88	49·94	53·60	58·48	61·24	59·62	58·20	53·10	51·03
16	46·45	44·98	46·47	47·77	50·00	53·67	58·53	61·33	59·43	58·16	52·90	50·90
17	46·30	44·91	46·43	47·66	50·09	53·80	58·70	61·50	59·30	58·10	52·80	50·79
18	46·18	44·87	46·40	47·60	50·20	54·00	58·78	61·54	59·18	57·98	52·74	50·65
19	45·95	44·90	46·38	47·60	50·30	54·11	59·02	61·72	59·00	57·90	52·75	50·54
20	45·92	44·92	46·32	47·58	50·40	54·23	59·23	61·83	58·90	57·72	52·70	50·40
21	45·90	45·21	46·23	47·62	50·56	54·39	59·43	62·00	58·88	57·62	52·74	50·00
22	45·85	45·32	46·06	47·70	50·67	54·52	59·63	62·02	58·80	57·55	52·78	49·99
23	45·92	45·45	46·00	47·76	50·80	54·63	59·67	62·01	58·71	57·50	52·68	49·94
24	45·90	45·61	45·87	47·89	50·91	54·92	59·87	62·02	58·55	57·41	52·65	49·30
25	45·96	45·80	45·72	48·00	51·05	55·20	60·11	62·00	58·58	57·24	52·68	48·97
26	45·90	45·90	45·60	48·12	51·18	55·42	60·28	61·92	58·61	57·13	52·51	48·58

(III.)—Reading of a Thermometer whose bulb is sunk to the depth of 6·4 feet (6 French feet) below the surface of the soil, at Noon on every Day—*concluded.*

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
27	45·91	45·93	45·50	48·26	51·28	55·61	60·30	61·83	58·57	56·91	52·34	48·60
28	45·85	45·97	45·48	48·41	51·29	55·78	60·33	61·77	58·58	56·90	52·05	48·41
29	45·87	46·07	45·49	48·60	51·37	55·91	60·38	61·60	58·52	56·59	51·98	48·32
30	45·90		45·47	48·80	51·40	56·09	60·49	61·51	58·48	56·42	51·95	48·26
31	45·90		45·57		51·44		60·47	61·30		56·24		48·36
Means.	46·43	45·22	46·25	47·39	50·08	53·73	58·62	61·24	59·61	57·78	53·62	50·38

(IV.)—Reading of a Thermometer whose bulb is sunk to the depth of 3·2 feet (3 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	45·00	42·62	44·75	44·28	49·20	53·80	60·83	64·30	62·01	58·30	53·37	48·08
2	45·00	42·86	45·10	44·81	48·81	54·10	60·99	63·98	61·55	58·10	52·61	48·03
3	44·75	43·09	45·08	45·13	48·52	54·26	61·18	63·73	61·21	57·80	52·00	48·48
4	44·90	43·00	45·30	45·49	48·44	54·42	61·58	63·72	61·08	57·70	51·62	48·86
5	45·17	42·78	45·40	45·89	48·62	54·70	61·82	63·57	61·10	57·90	51·64	49·08
6	44·90	42·48	45·28	46·48	49·00	54·90	62·00	63·44	61·28	58·05	51·68	49·05
7	43·60	42·20	45·50	47·00	49·40	55·05	62·20	63·58	61·39	58·35	51·71	49·00
8	43·45	41·93	45·40	47·60	49·80	55·31	62·40	63·81	61·40	58·61	51·31	48·80
9	42·98	41·62	45·16	47·96	50·00	55·52	62·53	64·43	61·10	58·81	50·70	48·80
10	42·43	41·40	44·98	48·25	50·12	55·55	62·55	64·81	60·60	58·92	50·06	48·56
11	41·95	41·17	44·70	48·32	50·29	55·60	62·60	65·12	60·12	58·94	49·50	48·26
12	41·65	40·70	44·44	47·90	50·40	55·69	62·44	65·23	59·66	58·77	48·80	48·10
13	41·40	40·42	43·92	47·23	50·55	55·88	62·28	65·42	59·23	58·36	48·30	47·95
14	41·20	40·00	43·52	46·53	50·58	56·08	62·43	65·72	58·91	58·21	48·32	47·64
15	41·02	40·00	43·60	45·90	50·48	56·41	62·80	66·19	58·63	58·00	48·63	47·29
16	40·87	40·50	43·93	45·64	50·64	56·48	63·40	66·62	58·36	57·54	49·32	47·11
17	40·60	41·31	43·90	45·72	50·98	56·58	64·00	66·88	58·20	57·22	49·90	47·03
18	40·80	41·98	43·80	46·01	51·28	56·60	64·48	66·80	58·26	57·14	50·23	47·00
19	41·08	42·70	43·34	46·30	51·50	56·78	64·72	66·90	58·38	57·30	50·39	46·96
20	41·59	43·13	42·88	46·48	51·85	57·30	64·90	66·58	58·36	57·20	50·50	46·72
21	42·04	43·50	42·41	46·71	52·30	58·04	65·14	66·33	58·40	57·10	50·41	46·43
22	42·40	43·76	42·08	47·10	52·48	58·80	65·29	65·80	58·40	56·78	50·20	46·28
23	42·43	44·16	41·90	47·42	52·68	59·32	65·31	65·50	58·50	56·28	49·87	45·82
24	42·10	44·31	41·80	47·89	52·70	59·47	65·42	65·19	58·67	55·72	49·49	44·76
25	42·18	44·11	41·72	48·35	52·50	59·39	65·22	64·68	58·78	55·22	49·22	44·20
26	42·20	43·85	42·02	48·82	52·21	59·54	64·85	64·05	58·84	54·88	49·04	43·23
27	42·19	43·98	42·02	48·96	52·00	59·86	64·80	63·50	58·78	54·51	48·97	43·20
28	42·20	44·20	42·33	49·10	51·90	60·20	65·00	63·20	58·80	54·40	48·75	43·41
29	42·30	44·41	42·79	49·32	52·05	60·60	64·74	62·88	58·70	54·23	48·72	44·48
30	42·41		43·33	49·30	52·50	60·80	64·48	62·82	58·50	54·10	48·45	45·32
31	42·37		43·78		53·12		64·40	62·51		53·76		45·92
Means.	42·55	42·46	43·75	47·06	50·87	56·90	63·44	64·75	59·57	57·04	50·12	46·90

(V.)—Reading of a Thermometer whose bulb is sunk to the depth of 1 inch below the surface of the soil, at Noon on every Day.

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	46·0	43·0	47·5	47·2	47·0	57·8	64·8	63·0	58·0	56·2	45·2	47·5
2	38·3	43·0	45·0	46·3	46·0	57·3	65·0	64·0	58·0	54·0	44·9	49·0
3	52·0	41·4	48·2	47·0	47·2	57·2	67·5	65·0	59·0	56·3	45·8	50·5
4	44·0	40·2	46·0	50·0	48·8	57·3	67·2	64·4	60·3	59·3	48·8	49·0
5	38·7	37·5	44·6	51·2	50·0	58·0	67·0	64·0	62·0	59·3	48·6	49·0
6	33·0	38·0	47·8	52·0	51·5	58·0	67·0	64·0	62·3	60·0	49·7	47·0
7	37·0	36·7	43·0	52·1	52·0	58·2	67·0	66·8	60·4	61·0	45·5	47·1
8	30·2	37·0	45·0	52·2	51·5	58·5	67·0	67·0	59·0	60·9	43·0	47·7
9	33·7	36·0	43·0	52·2	51·0	58·0	65·7	70·0	56·8	61·0	41·8	44·0
10	34·8	35·5	40·8	49·0	51·0	50·7	64·5	68·0	56·7	59·4	41·2	45·0
11	34·0	32·0	43·0	46·0	52·5	56·2	63·2	66·0	55·5	58·1	40·2	44·5
12	32·0	34·0	40·4	43·0	50·5	60·0	62·5	67·0	55·0	56·8	40·8	45·0
13	33·8	33·0	38·8	41·3	50·5	60·3	65·0	71·0	54·3	58·4	44·0	43·0
14	35·0	37·0	43·7	40·1	50·3	59·0	68·0	71·3	56·0	56·8	47·4	42·8
15	35·0	43·2	43·5	44·0	51·0	59·6	69·5	72·0	55·3	54·3	51·0	43·7
16	31·2	43·0	42·1	45·4	52·5	57·0	68·0	73·0	55·3	54·0	52·0	44·0
17	37·0	46·0	41·0	46·3	53·7	58·2	72·0	70·4	57·0	56·8	51·0	44·2
18	42·0	47·5	38·3	47·6	52·0	59·0	69·0	70·5	57·2	57·0	50·2	44·0
19	41·0	45·8	36·8	47·0	54·2	60·5	70·0	69·0	57·0	57·1	50·0	44·0
20	43·0	43·8	37·4	48·3	54·0	65·0	70·0	67·3	57·0	56·0	48·2	44·0
21	43·8	47·0	37·0	49·2	56·0	67·0	70·0	66·0	57·0	53·3	47·0	42·0
22	40·0	47·6	38·0	50·0	56·0	66·1	70·0	65·5	58·5	51·5	45·8	40·5
23	37·2	46·0	37·0	50·0	55·2	62·0	68·3	63·4	60·0	50·3	43·9	38·9
24	41·0	42·2	39·7	52·0	53·5	62·0	65·2	62·3	59·4	50·0	44·0	37·0
25	39·0	42·0	42·6	52·5	50·5	62·4	66·0	60·0	59·0	48·4	47·0	38·5
26	40·0	45·0	40·0	51·5	51·0	64·3	67·0	59·5	59·3	50·8	46·7	37·0
27	42·0	45·0	40·1	51·3	53·0	64·0	67·0	60·8	58·3	50·4	46·7	41·5
28	40·5	46·0	44·7	51·8	54·0	66·0	66·2	61·2	59·0	50·2	45·5	46·8
29	38·0	48·0	45·7	51·0	55·3	65·0	63·5	62·0	57·0	51·0	44·0	47·3
30	40·5		45·7	48·6	57·0	63·0	66·0	62·0	56·0	50·0	43·5	46·9
31	45·0		48·2		58·0		66·0	58·0		47·3		48·8
Means.	38·7	41·5	42·4	48·5	52·2	60·3	66·9	65·6	57·9	55·0	46·1	44·5

(VI.)—Reading of a Thermometer within the case covering the deep-sunk Thermometers, whose bulb is placed on a level with their scales, at Noon on every Day.

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	46·5	45·0	48·5	52·8	48·8	67·5	71·0	64·5	60·0	56·8	47·1	55·0
2	37·0	44·5	47·2	55·0	48·2	67·8	73·6	70·0	62·0	54·8	46·6	53·7
3	48·0	45·3	53·7	57·7	54·2	63·5	76·5	69·0	61·7	63·6	48·0	54·4
4	44·5	39·9	48·0	64·5	57·0	63·2	76·8	69·5	64·1	67·2	52·0	48·2
5	36·8	37·5	46·8	58·5	59·2	60·0	71·5	69·8	66·8	69·9	48·8	50·7
6	30·8	37·1	51·3	59·9	62·0	61·0	73·8	70·6	65·5	66·7	50·2	51·5
7	33·5	37·3	45·0	60·0	56·5	64·5	75·2	76·2	60·5	68·5	45·8	47·8
8	27·0	35·7	48·4	66·2	55·8	65·5	73·0	74·2	61·2	64·8	43·3	46·8
9	32·4	35·7	43·7	58·4	55·5	62·5	72·7	84·3	59·5	64·1	39·7	41·6
10	32·1	36·5	37·3	50·0	56·5	56·3	67·5	76·1	58·7	58·5	37·8	44·5
11	35·5	28·9	47·9	47·3	61·4	64·5	65·8	74·0	56·1	61·3	40·9	43·4
12	31·5	34·8	44·0	41·5	53·0	73·8	69·0	81·0	55·2	64·2	40·5	45·0
13	32·3	33·8	39·8	39·9	54·5	64·2	77·2	88·5	53·7	63·2	46·0	44·0
14	34·7	44·8	50·8	40·3	56·9	65·8	84·2	86·0	61·2	58·6	57·6	42·7
15	34·2	47·5	46·2	53·2	56·2	66·1	84·5	86·8	61·8	60·2	57·0	43·8

(VI.)—Reading of a Thermometer within the case covering the deep-sunk Thermometers, whose bulb is placed on a level with their scales, at Noon on every Day—*concluded.*

Days of the Month, 1876.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
16	28 ·5	47 ·3	44 ·8	53 ·5	59 ·5	57 ·0	81 ·3	82 ·0	57 ·8	59 ·6	60 ·4	44 ·5
17	40 ·0	52 ·1	42 ·1	49 ·2	60 ·1	60 ·8	86 ·0	80 ·0	61 ·1	67 ·2	54 ·8	44 ·4
18	46 ·0	56 ·8	41 ·3	54 ·3	56 ·0	64 ·8	77 ·0	71 ·0	65 ·0	65 ·1	54 ·3	44 ·9
19	45 ·5	49 ·8	35 ·6	53 ·0	63 ·5	70 ·0	78 ·5	73 ·5	63 ·6	66 ·5	52 ·8	42 ·8
20	44 ·8	43 ·7	39 ·5	53 ·4	62 ·5	80 ·0	78 ·8	69 ·2	63 ·0	54 ·8	47 ·8	42 ·8
21	45 ·4	53 ·7	38 ·8	55 ·2	69 ·7	82 ·2	80 ·8	73 ·0	67 ·5	51 ·4	46 ·8	43 ·0
22	39 ·0	53 ·1	42 ·2	57 ·0	62 ·8	73 ·2	82 ·5	67 ·2	69 ·5	47 ·5	43 ·3	39 ·2
23	39 ·5	48 ·0	42 ·0	56 ·4	58 ·5	62 ·0	65 ·2	66 ·2	65 ·2	47 ·0	39 ·8	35 ·8
24	48 ·0	44 ·2	50 ·0	60 ·8	54 ·2	65 ·0	63 ·8	65 ·8	61 ·5	47 ·0	43 ·0	35 ·0
25	39 ·3	45 ·3	51 ·3	58 ·5	49 ·0	71 ·3	77 ·0	61 ·0	61 ·8	46 ·2	53 ·8	37 ·0
26	43· 5	49 ·0	40 ·0	57 ·5	51 ·5	73 ·8	79 ·0	63 ·5	65 ·7	53 ·2	53 ·3	34 ·4
27	47 ·0	48 ·9	41 ·2	52 ·2	59 ·5	73 ·3	70 ·2	63 ·2	58 ·0	48 ·4	47 ·2	48 ·3
28	40 ·5	51 ·5	52 ·3	55 ·0	56 ·5	76 ·0	70 ·3	65 ·2	63 ·3	50 ·2	45 ·9	54 ·0
29	41 ·5	53 ·4	49 ·8	57 ·5	66 ·0	72 ·2	66 ·5	65 ·5	61 ·2	53 ·2	45 ·7	52 ·5
30	47 ·7		51 ·8	46 ·1	68 ·5	66 ·0	74 ·4	69 ·5	56 ·5	52 ·9	46 ·5	52 ·9
31	53 ·0		61 ·4		63 ·4		65 ·0	58 ·2		47 ·0		53 ·8
Means .	39 ·5	44 ·2	45 ·9	54 ·2	58 ·0	67 ·1	74 ·5	72 ·1	61 ·6	58 ·1	47 ·9	45 ·8

ABSTRACT of the CHANGES of the DIRECTION of the WIND, as derived from OSLER'S ANEMOMETER.

1876, Month.	Direction of the Wind. At beginning of Month.	Direction of the Wind. At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Monthly Excess of Motion. Retrograde.
				d h m			
January . .	S.S.W.	S.S.E.	− 45	2. 9. 30	+ 360		
				8. 8. 30	+ 360		
				8. 22. 0	+ 360		
				12. 22. 0	− 360		
				15. 22. 0	+ 360		
				21. 8. 45	− 360		
				22. 22. 0	+ 360	1755	
				25. 0. 15	− 360		
				25. 20. 45	+ 720		
				25. 22. 0	− 360		
				26. 2. 45	+ 360		
				29. 9. 15	+ 360		
February .	S.S.E.	S.W.	+ 67½	13. 20. 45	+ 360	787½	
				20. 1. 0	+ 360		
March . . .	S.W.	W.S.W.	+ 22½	21. 22. 0	− 360		
				24. 8. 30	− 360		1057½
				30. 20. 45	− 360		
April	W.S.W.	N.N.E.	+ 135	2. 9. 15	+ 360		
				2. 22. 0	− 360		
				3. 2. 40	+ 360		
				12. 8. 40	+ 360	855	
				17. 2. 45	+ 360		
				22. 8. 40	+ 360		
				30. 11. 0	− 720		
May	N.N.E.	S.E.	+ 112½	2. 22. 0	− 360		
				4. 20. 50	− 720		
				4. 22. 0	+ 360		
				4. 22. 15	+ 360		
				6. 22. 0	− 360		
				7. 9. 0	+ 720		
				8. 1. 0	− 360		967½
				9. 9. 50	− 360		
				10. 22. 0	− 360		
				11. 20. 45	− 720		
				20. 9. 35	+ 360		
				20. 22. 0	+ 720		
				23. 22. 0	− 360		
June	S.E.	W.S.W.	− 157½	0. 22. 0	− 360		
				1. 10. 30	+ 360		
				2. 22. 0	+ 360		
				5. 22. 0	+ 360		
				8. 9. 40	− 360		
				11. 20. 50	+ 360		
				12. 2. 50	+ 360		
				12. 7. 50	+ 360		
				13. 2. 45	+ 360		
				15. 21. 0	− 360		
				16. 8. 30	− 360		1237½
				19. 2. 50	− 360		
June—*cont.*				20. 22. 0	− 360		
				21. 20. 45	− 360		
				24. 22. 0	− 360		
				25. 8. 0	− 360		
				25. 20. 30	− 360		
				27. 8. 45	+ 360		
				27. 21. 0	− 360		
				28. 8. 45	+ 360		
				28. 22. 0	− 360		
July	W.S.W.	W.	+ 22½	2. 22. 0	+ 360		
				6. 2. 30	− 360		
				13. 22. 0	+ 720		
				14. 0. 15	− 1080		
				14. 2. 50	+ 360		
				14. 20. 50	+ 360		
				15. 22. 0	+ 360		
				16. 8. 40	+ 360	1102½	
				18. 0. 15	− 360		
				19. 22. 0	+ 360		
				22. 1. 45	− 360		
				22. 8. 15	− 720		
				25. 20. 50	+ 360		
				27. 22. 0	+ 360		
				30. 20. 50	+ 360		
August . . .	W.	W.	0	2. 8. 40	+ 720		
				2. 20. 50	− 360		
				8. 11. 40	− 360		
				8. 22. 0	+ 360		
				11. 2. 40	+ 1440		
				12. 1. 40	− 720		
				13. 20. 55	+ 360		
				14. 2. 40	+ 360		
				15. 2. 50	− 360		
				15. 8. 30	− 360		
				15. 22. 0	− 360		
				16. 0. 10	− 360	720	
				17. 2. 45	− 360		
				17. 22. 0	− 360		
				18. 0. 15	+ 360		
				19. 8. 15	+ 360		
				19. 22. 0	+ 360		
				20. 22. 0	− 360		
				21. 2. 40	− 720		
				21. 9. 10	+ 360		
				23. 20. 55	+ 360		
				29. 9. 30	+ 360		
September	W.	E.N.E.	+ 157½	2. 22. 0	+ 360		
				14. 22. 0	+ 360		
				16. 8. 30	− 360		
				16. 22. 0	+ 360		
				20. 9. 0	+ 360	157½	

The sign + implies that the change in the direction of the wind has taken place in the order N., E., S., W., N., &c., or in *direct* motion; the sign − implies that the change has taken place in the order N., W., S., E., N., &c., or in *retrograde* motion.

The times of shifts of the recording pencil, as given above, refer to the shifts made by hand, when, by the turning of the vane, the trace tends to travel or has travelled out of range.

ABSTRACT of the CHANGES of the DIRECTION of the WIND—*concluded.*

1876, Month.	Direction of the Wind. At beginning of Month.	Direction of the Wind. At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Monthly Excess of Motion. Retrograde.
			°	d h m	°	°	°
September—*cont.*				21. 0.45	− 720		
				21.22. 0	− 360		
				28. 0.15	+ 360		
				29.22. 0	− 360		
October ..	E.N.E.	N.	− 67½	1.22. 0	+ 360		
				2. 2.50	− 720		
				16. 2.45	+ 360		
				17. 0. 0	− 360		
				17. 9.10	+ 360		1147½
				18.22. 0	− 360		
				22.22. 0	− 360		
				25. 2.50	− 360		
				25.22. 0	+ 360		
				26.22. 0	− 360		
November	N.	E.S.E.	+ 112½	4.22. 0	+ 360		
				10. 9.40	− 360		
				11. 8.10	− 360		
				11.22. 0	− 360		
November—*cont.*				14.20.50	+ 360		
				15. 9.20	− 360		247½
				16.22. 0	+ 360		
				22.22. 0	+ 360		
				25. 0.50	+ 360		
				26.22. 0	− 360		
				29.22. 0	− 360		
December.	E.S.E.	S.S.W.	− 270	0.22. 0	+ 360		
				7. 2.40	− 360		
				7. 8.10	+ 360		
				7.22. 0	− 360		
				13.22. 0	− 360		
				15.22. 0	+ 360		270
				16. 8. 0	− 360		
				18.22. 0	+ 360		
				22.22. 0	− 360		
				24. 7.40	+ 360		
				26. 8.40	+ 360		
				27. 0.20	− 360		

The whole excess of direct motion for the year was 450°.

The sign + implies that the change in the direction of the wind has taken place in the order N., E., S., W., N., &c., or in *direct* motion; the sign − implies that the change has taken place in the order N., W., S., E., N., &c., or in *retrograde* motion.

The times of shifts of the recording pencil, as given above, refer to the shifts made by hand, when, by the turning of the vane, the trace tends to travel or has travelled out of range.

The revolution-counter which is attached to the vertical spindle of the vane, whose readings increase with change of direction of the wind in *direct* motion, and decrease with change of direction in *retrograde* motion, gave the following readings:—

	revs.
On 1875, December 31d. 12h	+1·7
On 1876, December 31d. 12h	+3·0

Implying an excess of direct motion, during the year, of 1·3 revolution, or 468°.

MEAN HOURLY MEASURES of the HORIZONTAL MOVEMENT of the AIR in each Month, and GREATEST and LEAST HOURLY MEASURES, as derived from the Records of ROBINSON'S ANEMOMETER.

Hour ending	1876. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean for the Year.
h	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
1 a.m.	11·1	13·8	16·1	10·5	8·6	7·7	7·9	8·5	9·8	8·7	9·5	12·4	10·4
2 a.m.	11·5	14·4	16·4	10·5	8·9	7·7	7·9	8·5	10·3	9·0	9·6	12·2	10·6
3 a.m.	11·0	13·3	15·7	9·8	8·6	7·1	7·8	8·4	10·5	9·2	10·1	11·9	10·3
4 a.m.	11·1	13·7	16·6	10·0	8·5	7·2	7·4	8·1	10·7	9·6	10·5	11·9	10·4
5 a.m.	11·2	13·2	16·6	9·6	8·9	7·5	7·8	8·5	10·3	9·4	10·1	12·1	10·4
6 a.m.	11·0	14·3	16·6	9·6	8·9	7·8	7·4	8·5	10·4	9·1	10·0	12·4	10·5
7 a.m.	11·4	14·1	16·1	10·8	10·5	8·5	7·8	8·6	10·3	9·5	10·0	12·9	10·9
8 a.m.	11·5	15·9	17·0	11·8	11·9	9·2	8·5	9·4	10·8	9·1	9·6	12·5	11·4
9 a.m.	11·2	15·7	18·5	12·8	12·6	10·7	10·2	10·6	11·4	9·7	9·9	12·5	12·1
10 a.m.	11·3	16·9	18·8	15·2	13·6	11·2	11·2	12·1	12·5	11·1	10·2	12·6	13·1
11 a.m.	11·6	17·4	20·3	15·8	13·9	11·6	11·4	12·7	12·8	11·2	11·0	12·9	13·6
Noon.	12·5	18·7	21·0	16·5	14·5	12·0	11·8	12·8	13·3	11·4	11·7	13·8	14·2
1 p.m.	13·0	18·4	21·8	17·5	15·3	12·4	12·4	14·0	14·9	12·3	12·9	15·1	15·0
2 p.m.	12·9	18·6	22·1	17·1	15·0	12·6	12·7	14·2	14·6	11·6	12·0	14·7	14·8
3 p.m.	12·7	17·8	21·8	17·3	15·1	12·6	12·3	14·6	14·2	11·4	11·4	14·5	14·6
4 p.m.	12·1	16·7	20·2	17·3	15·9	12·6	12·8	14·5	13·8	11·2	10·7	14·5	14·4
5 p.m.	11·1	16·6	20·1	16·4	15·1	11·8	12·2	14·1	12·2	10·2	9·8	13·8	13·6
6 p.m.	11·3	15·1	18·0	15·3	13·3	11·8	12·3	13·4	9·9	9·4	10·4	14·1	12·9
7 p.m.	11·6	14·8	17·0	14·5	12·3	10·6	11·4	11·6	9·4	10·2	10·4	14·1	12·3
8 p.m.	11·8	15·1	16·3	13·2	10·9	10·0	10·0	10·6	9·6	9·9	10·2	13·6	11·8
9 p.m.	11·3	15·4	15·5	11·9	9·8	8·6	9·7	10·0	10·2	9·5	10·4	13·6	11·3
10 p.m.	11·1	15·2	15·8	12·0	9·5	8·3	9·6	9·7	10·7	8·9	9·7	12·9	11·1
11 p.m.	11·5	15·2	15·3	11·5	9·2	7·7	9·2	9·8	10·0	8·7	9·2	12·8	10·8
Midnight.	10·8	14·5	15·9	10·9	8·6	7·6	8·3	9·3	9·5	9·5	8·8	13·4	10·6
Means	11·6	15·6	17·9	13·2	11·6	9·8	10·0	10·9	11·3	10·0	10·3	13·2	12·1
Greatest Hourly Measures	30	40	51	43	30	29	26	35	36	34	32	45	..
Least Hourly Measures	0	1	1	0	0	0	0	0	0	1	0	0	..

TOTAL AMOUNT OF OZONE registered Daily, and MEAN DISTRIBUTION through the DAY, for each MONTH, APRIL to DECEMBER, in the Year 1876.

Days of the Month. 1876.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d									
1	0·5	1·4	11·5	0·1	3·8	0·0	2·5	0·0	8·2
2	4·5	1·1	5·4	0·4	8·9	0·0	7·0	0·0	7·9
3	2·2	7·6	17·4	0·0	7·6	1·5	1·9	0·0	16·3
4	0·5	9·6	12·8	0·4	5·2	12·5	2·4	0·0	14·5
5	0·8	9·1	10·4	1·1	0·0	10·5	9·1	0·0	11·9
6	1·2	6·7	2·1	4·0	2·5	5·4	2·1	0·0	6·1
7	12·3	12·3	1·9	3·5	5·0	2·6	0·8	0·0	1·5
8	10·2	15·5	5·6	4·0	0·0	0·0	3·9	0·0	0·0
9	12·1	18·7	0·0	3·5	1·0	0·0	12·9	3·0	0·0
10	22·5	6·8	0·1	1·5	3·0	0·0	6·9	0·0	0·0
11	4·5	7·6	1·4	0·4	4·5	0·0	14·4	7·0	1·6
12	1·4	8·9	0·0	1·1	5·5	0·0	8·5	3·0	6·4
13	4·6	2·0	0·0	0·2	3·0	0·0	3·0	0·0	0·0
14	10·7	0·0	3·5	3·3	2·0	0·0	1·0	0·0	0·0
15	17·9	9·6	11·0	1·1	3·5	2·8	0·2	0·2	0·8
16	12·4	7·8	0·0	1·4	4·0	2·0	3·2	3·2	3·7
17	6·6	11·5	10·0	3·5	5·4	0·1	3·5	1·8	4·5
18	21·0	7·6	7·0	0·5	1·1	0·4	1·0	2·0	0·0
19	21·5	7·3	3·7	0·0	6·5	0·0	0·0	3·0	1·5
20	21·6	3·4	10·0	1·0	11·0	0·0	0·0	0·0	9·0
21	18·5	3·7	12·3	2·5	1·0	0·0	0·0	0·0	4·5
22	1·6	10·0	0·5	5·7	0·0	4·4	0·0	2·8	0·0
23	13·3	9·9	0·0	1·8	2·5	1·4	0·0	5·5	0·0
24	19·2	5·7	9·8	0·0	0·0	6·5	0·0	3·5	0·0
25	8·4	0·9	6·8	0·0	0·0	3·8	0·0	7·8	1·5
26	2·4	0·4	2·5	0·0	1·5	2·0	0·0	1·7	10·1
27	12·7	0·0	1·5	2·0	4·5	0·7	0·0	5·3	6·4
28	8·2	0·0	1·5	4·0	1·0	3·3	0·0	0·0	4·5
29	15·4	2·0	0·5	2·2	3·0	0·0	0·0	0·0	1·9
30	10·1	4·0	0·0	11·0	10·5	1·7	0·0	1·1	10·1
31		0·5		9·6	4·5		0·0		10·3
Mean Amount in the 12 hours ending 9h. a.m.	3·9	1·8	1·3	0·9	1·3	1·2	1·6	1·0	3·4
Mean Amount in the 6 hours ending 3h. p.m.	3·6	2·8	2·1	0·8	1·3	0·7	0·8	0·6	0·7
Mean Amount in the 6 hours ending 9h. p.m.	2·5	1·6	1·6	0·6	1·0	0·2	0·3	0·1	0·5
Mean Daily Value.	10·0	6·2	5·0	2·3	3·6	2·1	2·7	1·7	4·6

AMOUNT OF RAIN COLLECTED IN EACH MONTH OF THE YEAR 1876.

1876, MONTH.	Number of Rainy Days.	Monthly Amount of Rain collected in each Gauge.								
		Self-registering Gauge of Osler's Anemometer.	Second Gauge at Osler's Anemometer.	On the Roof of the Octagon Room.	On the Roof of the Library.	On the Roof of the Photographic Thermometer Shed.	Crosley's.	Cylinder partly sunk in the Ground read daily.	Cylinder partly sunk in the Ground read Monthly.	On the "Royalist" Police Ship.
		in.	in.	in.	in.	in.	in.	in.	in.	in.
January......	13	0·46	0·48	0·70	0·90	1·06	1·03	1·11	1·10	0·60
February.....	19	1·11	1·12	1·33	1·27	1·52	1·82	1·50	1·60	1·16
March	18	1·15	1·45	1·87	1·91	2·27	2·64	2·32	2·53	1·74
April........	9	0·51	0·57	0·83	0·96	1·28	1·66	1·27	1·37	0·81
May.........	5	0·77	0·77	0·97	1·08	1·14	1·33	1·13	1·09	0·65
June.........	10	0·77	0·84	0·96	1·11	1·09	1·12	1·08	1·00	1·02
July.........	8	0·41	0·41	0·53	0·50	0·64	0·71	0·67	0·64	0·49
August	13	1·37	1·37	1·63	1·75	1·92	2·50	2·01	1·70	1·65
September....	22	1·74	1·85	2·10	2·36	2·48	3·07	2·58	2·66	1·75
October......	12	0·97	1·14	1·34	1·42	1·50	1·80	1·61	1·71	0·91
November....	16	2·23	2·51	2·56	3·14	2·99	3·56	3·06	3·03	2·38
December	22	4·00	4·48	4·67	5·38	5·63	5·42	5·76	5·82	4·43
Sums	167	15·49	16·99	19·49	21·78	23·52	26·66	24·10	24·25	17·59

The heights of the receiving surfaces are as follows:

	Above the Mean Level of the Sea. Ft.	In.		Above the Ground. Ft.	In.
The Two Gauges at Osler's Anemometer	205	6	....	50	8
Gauge on the Roof of the Octagon Room	193	2½	....	38	4½
Gauge on the Roof of the Library	177	2	....	22	4
Gauge on the Roof of the Photographic Thermometer Shed.......	164	10	....	10	0
Crosley's Gauge	156	6	....	1	8
The Two Cylinder Gauges partly sunk in the Ground	155	3	....	0	5
				Above Deck. Ft.	In.
Gauge on the "Royalist" Police Ship, moored in Blackwall Reach.	17	0	....	8	8

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

LUMINOUS METEORS.

1876.

Month and Day, 1876.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s						°	
February	27	10. 10.	E.	2	Yellowish	0·5	None	10	1
March	3	9. 10. 42	T.	Sirius	Bluish-white	0·8	Train	12	2
April	15	8. 23.±	P.	2	Bluish-white	0·8	Slight	..	3
	,,	13. 0.±	M.	>Jupiter	Bluish-white	3 or 4 seconds	½ minute	..	4
April	18	10. 17. 16	N.	>Jupiter	Pale yellow	2	Fine; 5ˢ	15	5
April	25	10. 59. 15	C.	1	Bluish-white	0·9	Train	10	6
April	26	10. 32.±	P.	2	White	0·3	None	..	7
June	20	10. 37. 4	P.	3	White	0·3	None	..	8
July	23	9. 51.	N.	2	Bluish-white	0·5	None	12	9
July	24	10. 4.	J.	2	White	0·4	None	..	10
	,,	11. 1.	N.	2	White	0·6	Train	8	11
	,,	11. 2.	N.	1	White	0·5	Train	7	12
July	25	10. 2.	L.	>Jupiter	. . .	4 or 5 seconds	. . .	..	13
August	7	9. 28.	N.	1	White	0·5	. . .	8	14
	,,	10. 26. 35	P.	3	White	0·2	None	..	15
August	8	9. 58. 35	P.	2	White	0·4	. . .	..	16
	,,	10. 17. 57	N., P.	1	White	0·5	None	7	17
	,,	10. 26. 0	N.	2	White	0·5	None	10	18
	,,	10. 59. 15	N.	2	White	0·4	None	5	19
	,,	11. 4. 3	P.	1	Bluish-white	0·5	. . .	..	20
	,,	11. 18. 19	N.	>Venus	Yellowish	1	Train	15	21
	,,	11. 24. 1	P.	3	White	0·4	. . .	..	22
August	9	9. 12. 4	P.	2	Bluish-white	0·5	None	..	23
	,,	9. 47. 50	P.	1	Bluish-white	0·4	Slight	..	24
	,,	9. 47. 56	C.	1	Reddish	0·6	. . .	10	25
	,,	9. 57. 46	N.	> 1	Bluish-white	0·8	Train	12	26
	,,	10. 12. 28	N., C.	2	Bluish-white	0·6	None	10	27
	,,	10. 22. 12	N.	3	White	0·4	None	5	28
	,,	10. 26. 26	P.	3	Yellowish	0·5	. . .	..	29
	,,	10. 36. 36	N.	2	White	0·6	Train	10	30
	,,	10. 42. 41	N.	1	Bluish-white	0·7	Train	10	31
	,,	10. 50. 8	N.	2	Bluish-white	0·5	None	10	32
	,,	11. 0. 40	P.	3	White	0·4	. . .	..	33
	,,	11. 0. 53	N.	> 1	Bluish-white	1	Fine	15+	34
	,,	11. 15. 22	N.	1	Bluish-white	0·6	Train	8	35
	,,	11. 15. 29	N.	3	White	0·4	None	4	36
August	10	9. 12. 30	P.	1	Bluish-white	0·7	Train	..	37
	,,	9. 29. 48	P.	> 1	White	0·4	Fine	..	38
	,,	9. 30.	C.	2	Bluish-white	0·8	Train	12	39
	,,	9. 41. 31	C.	3	Bluish-white	. . .	Slight	5	40
	,,	9. 45. 1	N.	1	Bluish-white	0·8	Train	12	41
	,,	9. 45. 30	C., P.	1	Bluish-white	0·8	Train	10	42
	,,	9. 47. 41	P.	1	Bluish-white	0·6	. . .	..	43
	,,	9. 52. 51	N.	> 1	Yellowish	0·8	Fine	12	44
	,,	9. 55. 26	N.	Venus	Yellowish	0·6	Fine	..	45
	,,	9. 56. 47	P.	> 1	Yellowish	0·7	Train	..	46
	,,	9. 57. 57	P.	1	White	0·3	. . .	..	47
	,,	9. 58. 3	N.	1	Bluish-white	0·5	Train	10	48
	,,	10. 0. 10	C.	2	Bluish-white	0·4	Slight	6	49
	,,	10. 3. 20	P.	1	White	0·4	. . .	..	50

August 7. Cloudy throughout the evening.
August 9. Partially cloudy.
August 8. Bright moonlight; sky cloudless.
August 10. Partially cloudy, especially after 10ʰ.

No. for Reference.	Path of Meteor through the Stars.
1	From direction of η Ursæ Majoris passed about 3° above ι Draconis. (Sky partially cloudy.)
2	Shot from a point about 4° to the right of μ Leonis, in direction of Pollux.
3	Appeared near β Aurigæ and disappeared a little above Castor.
4	Fell from near 28 Herculis to near ν Ophiuchi.
5	Travelled slowly from near α Cephei to α Cygni.
6	From about 3° above χ Leonis to about 4° below and to the right of Regulus.
7	Appeared a little to the left of δ Virginis and disappeared about 5° to the left of η Corvi.
8	Appeared a little above α Ophiuchi and disappeared midway between α and ϵ Serpentis.
9	From direction of ι Cephei, disappeared close to Polaris.
10	Appeared a little to the left of β Pegasi and disappeared a little to the right of ρ Andromedæ.
11	From a point slightly below γ Herculis passed across δ Serpentis.
12	Fell from direction of δ Coronæ Borealis midway between δ Serpentis and ϵ Boötis.
13	Moved from neighbourhood of α Ophiuchi across δ Serpentis and a little above ζ Boötis.
14	Across β Andromedæ from direction of α Cygni.
15	From about 7° to the left and above ϵ Boötis, disappeared near ξ Boötis.
16	From near θ Aquilæ, disappeared midway between α and β Aquarii.
17	Across ϵ Pegasi towards β Aquarii.
18	From direction of β Pegasi shot towards α Aquarii.
19	From near γ Cygni to λ Cygni.
20	Shot from λ Boötis towards a point midway between α Coronæ Borealis and ϵ Boötis.
21	Passed across δ and λ Aquilæ towards horizon.
22	Moved from a point about 4° to the left of and above α Ophiuchi towards 67 Ophiuchi.
23	Appeared near ρ Cygni and moved towards a point about 3° to left of γ Delphini.
24	Shot from a point midway between α Herculis and β Ophiuchi to a point about 2° to right of γ Ophiuchi.
25	From 92 Herculis, disappeared near β Herculis.
26	Appeared about 15° to left and above σ Sagittarii and fell towards horizon parallel to joining line of σ and ζ Sagittarii.
27	Fell a few degrees to left of β Herculis on line parallel to line joining ζ and β Herculis.
28	Fell towards horizon from a point about 15° below γ Herculis on a path in prolongation of a line joining β and γ Herculis.
29	Appeared near u Herculis and disappeared about 6° left of α Ophiuchi.
30	Passed 2° or 3° to left of ζ Aquilæ moving towards λ Aquilæ.
31	From direction of κ Cygni passed midway between α Lyræ and γ Draconis.
32	From direction of a point about midway between α Coronæ Borealis and β Herculis, passed near δ Serpentis.
33	Appeared near μ Aquilæ and disappeared about 4° to left of and slightly above γ Aquilæ.
34	Passed about 5° to left of α Cephei, disappeared at θ Cygni.
35	Passed a few degrees to left of ζ Cygni moving towards point slightly left of γ Delphini.
36	From direction of δ Sagittæ passed across α Vulpeculæ.
37	Appeared a little to right of δ Aquilæ and moved towards η Serpentis.
38	Shot across α Aquilæ from direction of α Delphini.
39	From direction of β Ursæ Majoris passed about 6° below α Canum Venaticorum.
40	Directed from γ Ursæ Majoris, passed a little below α Canum Venaticorum.
41	Passed midway between β Ursæ Minoris and ζ Ursæ Majoris on line parallel to line joining α and δ Ursæ Majoris, moving westward.
42	Shot from about 8° south of γ Pegasi towards Saturn.
43	Appeared near λ Andromedæ and disappeared near α Andromedæ.
44	From direction of η Ursæ Majoris, disappeared about 25° vertically below Arcturus.
45	From direction of δ Ursæ Majoris fell at angle of 45° to line joining δ and γ Ursæ Majoris.
46	Directed from 72 Ophiuchi towards η Ophiuchi.
47	Directed from η Boötis and moved towards π Boötis.
48	From direction of η Ursæ Majoris to a point 15° below Arcturus.
49	From about 8° to right of α Ursæ Majoris towards β Ursæ Majoris.
50	From β Equulei, disappeared 15° above α Capricorni.

Month and Day, 1876.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s						°	
August	10	10. 5. 7	C.	1	Bluish-white	0·5	Train	6	1
	,,	10. 6. 45	C.	3	Bluish-white	0·6	Slight	8	2
	,,	10. 16. 15	P.	> 1	Bluish-white	0·4	Fine	..	3
	,,	10. 17. 15	C.	2	Bluish-white	0·6	Slight	7	4
	,,	10. 24. 36	P.	3	White	0·3	. . .	..	5
	,,	10. 25. 55	C.	2	Bluish-white	0·6	None	8	6
	,,	10. 26. 20	P.	2	Bluish-white	0·4	. . .	..	7
	,,	10. 36. 37	P.	3	White	0·3	. . .	..	8
	,,	10. 37. 28	P.	> 1	Bluish-white	0·5	Train	..	9
	,,	10. 37. 39	C.	2	Bluish-white	0·8	Slight	10	10
	,,	10. 43. 55	P.	2	White	0·4	. . .	..	11
	,,	10. 59. 50	P.	1	Bluish-white	0·5	Train	..	12
	,,	11. 2. 25	P.	2	Bluish-white	0·3	. . .	..	13
	,,	11. 6. 49	C.	> 1	Bluish-white	1	Train	12	14
	,,	11. 21. 0	P.	2	Bluish-white	0·4	. . .	..	15
	,,	11. 21. 56	N.	2	Bluish-white	0·5	None	8	16
	,,	11. 34. 34	N.	1	Bluish-white	0·8	Train	12	17
	,,	11. 49. 0	N.	2	Bluish-white	0·8	None	15	18
	,,	11. 57. 47	N.	2	Bluish-white	0·7	None	10	19
	,,	12. 7. 0	P.	2	Bluish-white	0·6	. . .	..	20
August	11	8. 47.	P.	> 1	Yellowish	0·8	Fine	15	21
	,,	8. 59. 45	N.	1	Bluish-white	0·7	Train	10	22
	,,	9. 14. 43	P.	3	Bluish-white	0·3	None	5	23
	,,	9. 26. 51	N., P.	2	Bluish-white	0·7	Fine	..	24
	,,	9. 32. 27	P.	2	Bluish-white	0·4	None	9	25
	,,	9. 40. 28	N., P.	2	Bluish-white	0·5	. . .	8	26
	,,	9. 47. 0	C.	Jupiter	Bluish-white	1·4	Fine	18	27
	,,	9. 47. 20	N., P.	> 1	Bluish-white	0·7	Train	13	28
	,,	9. 48. 47	N., P.	3	White	0·3	None	5	29
	,,	10. 19. 47	P.	2	Bluish-white	0·6	None	8	30
	,,	10. 20. 59	N.	2	Bluish-white	0·5	Train	6	31
	,,	10. 21. 12	N., P.	> 1	Bluish-white	0·7	Fine	15	32
	,,	10. 21. 35	C.	2	Bluish-white	0·5	Slight	7	33
	,,	10. 21. 50	N., P.	1	Bluish-white	0·7	Train	..	34
	,,	10. 27. 7	N., C., P.	1	Bluish-white	1·5	Fine	20	35
	,,	10. 29. 7	N.	3	Bluish-white	0·5	None	5	36
	,,	10. 30. 12	N., P.	2	Bluish-white	0·6	None	8	37
	,,	10. 35. 47	N., C.	2	Bluish-white	0·7	Train	8	38
	,,	10. 37. 32	N., P.	2	Bluish-white	0·5	Train	7	39
	,,	10. 38. 13	P.	Venus	Yellow	0·5	Fine	9	40
	,,	10. 38. 25	P.	> 1	Reddish	0·5	Very fine	..	41
	,,	10. 40. 17	C.	1	Bluish-white	0·7	Train	10	42
	,,	10. 42. 5	N.	3	Bluish-white	0·5	Train	5	43
	,,	10. 45. 47	C.	2	Bluish-white	0·5	Slight	8	44
	,,	10. 49. 40	N.	4	Bluish-white	0·5	None	6	45
	,,	10. 51. 5	P.	2	Bluish-white	0·3	. . .	4	46
	,,	10. 51. 40	N.	> 1	Bluish-white	0·8	Train	12	47
	,,	10. 53. 10	N.	1	Bluish-white	0·8	Train	10	48
	,,	10. 53. 57	C.	3	Bluish-white	0·6	None	6	49
	,,	10. 55. 45	P.	1	Bluish-white	0·5	None	7	50
	,,	11. 5. 52	C.	2	Bluish-white	0·8	Train	12	51
	,,	11. 5. 59	C.	3	Bluish-white	0·6	None	8	52
	,,	11. 10. 9	P.	> 1	Yellowish	0·6	Brilliant	10	53
	,,	11. 13. 37	P.	1	Bluish-white	0·4	Train	7	54
	,,	11. 18. 26	N.	3	Bluish-white	0·3	None	3	55
	,,	11. 21. 3	P.	1	White	0·4	None	7	56
	,,	11. 23. 37	C.	2	Bluish-white	0·6	Slight	10	57
	,,	11. 24. 45	P.	> 1	Greenish	0·8	Fine	18	58
	,,	11. 28. 15	P.	1	Bluish-white	0·5	None	10	59
	,,	11. 34. 17	C.	Jupiter	Bluish-white	1·5	Train; 1s	15	60
	,,	11. 34. 49	N.	1	Bluish-white	0·7	Train	10	61
	,,	11. 38. 2	N.	3	Bluish-white	0·4	None	5	62

No. for Refer-ence.	Path of Meteor through the Stars.
1	Shot towards S.W. about 3° west of α Lyræ.
2	From near η Herculis shot across ζ Herculis.
3	From a point 5° above and right of α Andromedæ towards o Pegasi.
4	Passed about midway between α and β Ursæ Majoris in direction of γ Ursæ Majoris.
5	From ζ Pegasi to γ Aquarii.
6	Center of path midway between α Aquilæ and ϵ Delphini, moving at right angles to the line joining those stars.
7	From θ Pegasi, disappeared 10° left and below β Aquarii.
8	From ι Aquilæ to α Capricorni.
9	Shot from near ζ Draconis across α Lyræ.
10	From a point about 3° west of δ Aquilæ fell perpendicularly downwards a little east of λ Aquilæ.
11	From γ Boötis towards α Canum Venaticorum.
12	From a point midway between α Ophiuchi and δ Herculis moved towards a point 10° right of θ Serpentis.
13	Passed midway between α and β Herculis, moved towards σ Ophiuchi.
14	Appeared about 10° below θ Aquilæ and fell nearly perpendicularly towards horizon.
15	Shot from a point about 2° above η Ursæ Majoris, passed a little above γ Boötis.
16	From direction of β Draconis passed between γ and ϵ Boötis.
17	Passed across β Herculis towards horizon. Path almost at right angles to line joining β Herculis and α Coronæ Borealis.
18	From direction of α Pegasi passed across ϵ Pegasi.
19	Passed across α Andromedæ to a point midway between α and γ Pegasi.
20	From about 3° left and above α Ophiuchi towards γ Ophiuchi.
21	From ζ Pegasi towards α Equulei.
22	From direction of η Pegasi passed just below ϵ Pegasi.
23	From δ Equulei across α Equulei.
24	Appeared near ζ Cygni and disappeared midway between γ Aquilæ and β Sagittæ.
25	From δ Cygni towards α Delphini.
26	Passed a few degrees below ϵ Pegasi and α Equulei.
27	From near α Ophiuchi towards ζ Ophiuchi.
28	From a point midway between θ Aquilæ and α Capricorni to a point between λ Aquilæ and σ Aquarii.
29	Fell nearly vertically midway between λ Aquilæ and η Serpentis, moving from direction of γ Lyræ.
30	From direction of ϕ Andromedæ towards o Andromedæ.
31	From direction of α Delphini passed about 2° below Sagitta.
32	Passed midway between Delphinus and ϵ Pegasi and across θ Aquilæ.
33	Appeared about midway between β and θ Ophiuchi and fell a little to right of η Ophiuchi.
34	Passed midway between θ Aquilæ and α Capricorni from direction of α Equulei.
35	From a little below α Herculis fell perpendicularly towards horizon.
36	From γ Boötis moved towards α Canum Venaticorum.
37	From ν Boötis, disappeared at ϵ Coronæ Borealis.
38	Passed between ϵ and ζ Ursæ Majoris towards Arcturus.
39	From direction of α Cassiopeiæ passed between λ and κ Draconis.
40	Passed across α Canum Venaticorum from direction of γ Ursæ Majoris.
41	Passed about 2° above α Canum Venaticorum from direction of χ Ursæ Majoris.
42	Appeared about 15° to right of and above α Ursæ Majoris and moved towards that star. Path if produced would cross [α and γ Ursæ Majoris.
43	Passed between ζ and γ Aquarii moving from θ Pegasi.
44	Moved upwards at right angles to line joining λ and ι Andromedæ. Centre of path opposite ι Andromedæ.
45	From direction of η Draconis towards ϵ Coronæ Borealis.
46	From direction of α Ophiuchi passed a little to left of γ Ophiuchi.
47	Passed between π and ρ Herculis from direction of ζ Draconis.
48	From direction of α Andromedæ moved towards Saturn across γ Piscium.
49	From a point about 10° below γ Pegasi shot towards south at an angle of 45°.
50	From direction of β Ursæ Minoris passed a little to right of α Draconis.
51	From near γ Ursæ Minoris passed by ι Draconis in direction of δ Boötis.
52	From direction of β Ursæ Minoris moved towards γ Boötis.
53	From direction of δ Andromedæ towards γ Pegasi.
54	From near η Ursæ Majoris passed in direction of a point about 2° below γ Boötis.
55	Appeared about 5° below ϵ Persei and fell on a path in prolongation of line joining ν and ϵ Persei.
56	From a point midway between γ Andromedæ and β Persei moved towards the Moon.
57	Appeared about 10° to left of γ Ursæ Minoris and moved towards ι Draconis.
58	From direction of α Cassiopeiæ towards β Persei.
59	From near γ Persei towards ϵ Persei.
60	From about midway between α and β Cephei towards γ Draconis.
61	Passed across ϵ Ursæ Majoris (at center of path) moving from λ Draconis.
62	Passed across α Arietis from direction of γ Persei.

Month and Day, 1876.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s						°	
August	11	11. 39. 12	N., C.	4	Bluish-white	0·3	None	4	1
	,,	11. 41. 45	N., P.	2	Bluish-white	0·3	. . .	4	2
	,,	11. 44. 17	N., P.	3	Bluish-white	0·5	. . .	7	3
	,,	11. 46. 27	P.	3	Bluish-white	0·3	None	5	4
	,,	11. 49. 47	C.	1	Bluish-white	0·6	Train	6	5
	,,	11. 55. 5	C.	> 1	Bluish-white	0·8	Train	10	6
	,,	12. 8. 22	P.	> 1	Bluish-white	0·8	Fine	20	7
	,,	12. 18. 9	N.	3	Bluish-white	0·7	None	. .	8
	,,	12. 22. 10	N.	4	Bluish-white	0·4	None	6	9
	,,	12. 32. 34	N., C.	1	Bluish-white	0·8	Train	10	10
	,,	12. 47. 0	P.	> 1	Bluish-white	0·8	Fine	. .	11
	,,	14. 1. 40	P.	> 1	Bluish-white	0·5	Fine	8	12
August	12	9. 13. 17	P.	3	Bluish-white	0·6	. . .	7	13
	,,	9. 16. 5	C.	3	Bluish-white	0·6	None	8	14
	,,	9. 38. 13	P.	3	Bluish-white	0·5	. . .	6	15
	,,	9. 42. 55	C.	2	Bluish-white	0·5	Slight	6	16
	,,	9. 43. 26	P.	1	Bluish-white	0·7	Slight	10	17
	,,	9. 48. 20	P.	1	Bluish-white	0·7	Train	9	18
	,,	9. 53. 30	C.	2	Bluish-white	0·8	Train	10	19
	,,	9. 59. 5	C., P.	> 1	Bluish-white	1	Train	10	20
	,,	9. 59. 47	P.	1	Bluish-white	1	Train	12	21
	,,	10. 7. 30	C.	1	Bluish-white	0·8	Slight	10	22
	,,	10. 7. 32	C.	2	Bluish-white	0·8	None	. .	23
	,,	10. 17. 30	C., P.	2	Bluish-white	0·5	Slight	6	24
	,,	10. 27. 6	C., P.	1	Bluish-white	1	Fine	12	25
	,,	10. 36. 48	P.	1	Bluish-white	1	Train	12	26
	,,	11. 27. 13	N.	2	Bluish-white	0·7	None	10	27
August	13	9. 16. 19	P.	1	Bluish-white	0·6	Train	9	28
	,,	9. 26. 12	P.	Jupiter	Yellow	1·0	Splendid greenish train; 10s	. .	29
	,,	9. 47. 39	P.	3	Bluish-white	0·3	. . .	5	30
	,,	9. 57. 7	P.	2	Bluish-white	0·4	. . .	7	31
	,,	9. 57. 12	P.	3	Bluish-white	0·4	. . .	8	32
	,,	10. 4. 54	P.	3	Bluish-white	0·9	. . .	12	33
	,,	10. 11. 0	C.	> Jupiter	Bluish-white	1·3	Fine; 2s	16	34
	,,	10. 21. 59	P.	1	Bluish-white	> 1	. . .	15	35
	,,	10. 31. 49	P.	2	Bluish-white	0·6	. . .	8	36
	,,	10. 35. 8	P.	2	Bluish-white	0·7	. . .	9	37
	,,	10. 51. 40	P.	1	Bluish-white	0·9	Slight	12	38
	,,	11. 14. 29	N.	2	Bluish-white	0·5	Train	8	39
	,,	11. 30. 13	N.	1	Bluish-white	0·8	Fine	15	40
	,,	11. 41. 23	N.	2	Bluish-white	0·7	Train	12	41
	,,	11. 45. 35	N.	2	Bluish-white	0·3	Train	3	42
	,,	11. 48. 45	N.	3	Bluish-white	0·3	Train	3	43
	,,	11. 51. 41	N.	4	Bluish-white	0·3	Slight	3	44
	,,	11. 53. 30	N.	3	Bluish-white	0·4	None	4	45
	,,	12. 5. 28	N.	1	Bluish-white	0·8	Fine	15	46
	,,	12. 11. 54	N.	2	Bluish-white	0·7	Train	12	47
August	14	9. 31. 0	P.	2	Bluish-white	0·6	None	9	48
	,,	9. 42. 46	P.	3	Bluish-white	0·9	None	13	49
	,,	9. 47. 30	P.	2	Bluish-white	0·6	None	8	50
	,,	10. 23. 12	P.	1	Bluish-white	1·0	Fine	13	51
	,,	10. 27. 0	J.	2	Bluish-white	0·5	None	. .	52
	,,	10. 32. 1	P.	> 1	Bluish-white	1	Train	. .	53
	,,	11. 19. 5	N.	1	Bluish-white	0·7	Train	10	54
	,,	11. 29. 1	N.	1	Bluish-white	0·7	Train	12	55
August	16	8. 59.	P.	3	Bluish-white	0·6	None	8	56
	,,	9. 20.	P.	2	Bluish-white	0·8	None	10	57
	,,	9. 23.	P.	1	Bluish-white	1·0	Fine	13	58

August 12. Partially cloudy.

No. for Reference.	Path of Meteor through the Stars.
1	Passed between β and γ Trianguli towards a point about 5° above α Trianguli.
2	Passed above α Andromedæ from direction of θ Cassiopeiæ.
3	Moved from midway between α and γ Pegasi towards γ Aquarii.
4	From direction of Saturn moved towards δ Capricorni.
5	Passed between ε and ζ Ursæ Majoris (but nearer to ζ) at an angle of 45° with horizon.
6	From about 10° north of α Lyræ, disappeared close to that star.
7	Appeared about 5° above β Ursæ Minoris, moved towards β Draconis.
8	From direction of β Herculis passed nearly midway between α and ε Ophiuchi.
9	From κ towards λ Draconis.
10	From ι towards θ Aurigæ.
11	From a point a little to left of α Draconis passed midway between ε and ζ Ursæ Majoris.
12	Appeared near ε Cygni and moved towards γ Aquilæ.
13	From direction of β Cephei passed across δ Cephei.
14	From a little above α Capricorni towards ε Capricorni.
15	From near ι Pegasi moved towards ζ Pegasi.
16	From direction of a point about 3° above α Pegasi passed above ζ Pegasi.
17	From near α Cephei towards ν Cygni.
18	Passed across γ Cephei towards ψ Cassiopeiæ.
19	Appeared a little above ε Aquilæ moving towards β Ophiuchi.
20	From a little above α Andromedæ to about 5° above β Andromedæ.
21	Appeared a little above γ Andromedæ and disappeared a little below ψ Persei.
22	From near ζ Pegasi towards α Aquarii.
23	Path parallel to that of preceding and about 12° below.
24	From near α Cygni towards δ Cygni.
25	From α towards δ Aquarii.
26	From ε Aquilæ towards 72 Ophiuchi.
27	From direction of λ Andromedæ, disappeared at γ Andromedæ.
28	Passed below δ Cygni towards γ Delphini.
29	Passed near γ Cephei at right angles to line joining γ Draconis and α Lyræ.
30	Appeared about 2° above 72 Ophiuchi and moved towards ε Aquilæ.
31	Passed across β Coronæ Borealis from direction of λ Coronæ Borealis.
32	From direction of μ towards ε Coronæ Borealis.
33	From direction of a point midway between ι and θ Draconis, disappeared near π Serpentis.
34	Appeared about 3° west of α Cygni and moved parallel to line joining α and β Cygni.
35	Passed about 2° above α Pegasi and disappeared near γ Pegasi.
36	From direction of ζ Cassiopeiæ moved towards ν Andromedæ.
37	Passed across λ Persei from direction of γ Persei.
38	Passed about 2° to left of 72 Ophiuchi and disappeared near 58 Serpentis.
39	From direction of λ Aquilæ passed across η Ophiuchi.
40	Passed across δ and λ Aquilæ.
41	From direction of δ Cygni passed between γ Lyræ and β Cygni to a point slightly right of ε Aquilæ.
42	Appeared midway between δ Aquilæ and θ Serpentis, moving from direction of ε Aquilæ; line of flight parallel to line joining [δ and ι Aquilæ.
43	Passed a few degrees on left and opposite λ Aquilæ, moving from direction of ι Aquilæ.
44	Passed about 2° above δ Aquilæ moving from direction of η Aquilæ.
45	Passed across α Capricorni from direction of ε Aquarii.
46	Passed across δ Cygni and between β and γ Lyræ.
47	Passed across α Lyræ to ι Herculis.
48	Passed across β Pegasi towards a point about 3° above and to the left of α Pegasi.
49	Passed about midway between δ and π Draconis from direction of γ Cephei.
50	Passed a little to right of α Aquarii towards δ Capricorni.
51	Shot across θ Aquilæ from direction of δ Equulei.
52	Appeared at a point to left of δ Persei and disappeared a little to left of β Persei.
53	Passed near μ Cassiopeiæ from direction of η Cassiopeiæ.
54	From direction of a point midway between ε and δ Cygni disappeared midway between γ Delphini and γ Equulei.
55	Passed midway between λ Boötis and η Ursæ Majoris moving from direction of a point 2° or 3° left of ι Draconis.
56	From near θ Serpentis moved towards 70 Ophiuchi.
57	From a point near ζ Herculis, disappeared near δ Coronæ Borealis.
58	Passed across α Coronæ Borealis towards δ Serpentis.

Month and Day, 1876.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s							
August	20	9. 1. 40	P.	2	Bluish-white	0·5	None	8	1
August	21	8. 12.	G.	3 × Jupiter	Bright blue	1	Fine	..	2
	,,	11. 52.	N.	2	Bluish-white	0·5	Train	7	3
August	24	10. 31.	J.	> 1	Bluish-white	1	Train	..	4
August	25	9. 3. 0	C.	2	Bluish-white	0·6	None	7	5
	,,	9. 7. 13	P.	3	Bluish-white	0·6	None	10	6
August	27	10. 46. 20	N.	2	Bluish-white	0·5	Train	5	7
	,,	10. 46. 40	N.	1	Bluish-white	1	Fine	12	8
August	29	8. 59. 0	J.	> 1	Bluish-white	1·5	None	15	9
	,,	11. 9. 30	C.	2 × Jupiter	Yellow	2·5	Fine yellow; 3 secs	30	10
September	15	8. 44. +	P.	3	Bluish-white	0·8	None	8	11
September	17	8. 27. 39	P.	1	Yellow	1·0 +	Fine	14	12
September	19	11. 45. —	J., P.	2	White	1·8	None	15	13
September	20	11. 42. ±	E.	1	...	0·5	None	..	14
October	14	9. 33.	J.	2	Blue	1	None	12	15
October	15	9. 45.	P.	3	Bluish-white	0·7	None	8	16
	,,	10. 47. 30	N.	> 1	White	> 1	Fine	24	17
October	16	9. 43. 45	J.	3	Bluish-white	1	None	10	18
	,,	9. 45. 30	J.	2	Blue	1·5	None	10	19
	,,	10. 52. 0	J.	1	Bluish-white	1	None	..	20
	,,	12. 31. 50	N.	> 1	White	> 1	Fine	20	21
October	17	7. 5. 10	J.	1	Blue	1	None	10	22
	,,	9. 18. 3	P.	3	Bluish-white	0·5	None	6	23
November	14	10. 59. 30	N.	> 1	White	0·5	Train	10	24
	,,	11. 7. ±	J.	Jupiter	Red	1·0	None	20	25
	,,	11. 14. 30	P.	Sirius	Orange	1·5	Fine; 2s	12	26
	,,	11. 30. 0	P.	2	Bluish-white	0·6	None	8	27
	,,	11. 51. 42	P.	> 1	Bluish-white	1·8	Fine	20	28
	,,	12. 7. 26	G., P.	1	Bluish-white	1	None	18	29
	,,	12. 11. 42	G.	1	Blue	0·8	Splendid	20	30
	,,	12. 22. 6	P.	2	Blue	1	None	12	31
	,,	12. 24. 44	G., P.	2	Bluish-white	0·5	None	8	32
	,,	12. 40. 48	P.	2	Bluish-white	0·8	. . .	9	33
	,,	12. 43. 42	G.	1	Bluish-white	1	Slight	15	34
November	17	8. 28. 41	G.	1	Blue	0·8	None	5	35
	,,	8. 41. 6	G.	2	Bluish-white	1·0	Fine	9	36
	,,	9. 30.	G.	1	Bluish-white	1·0	Splendid	24	37
	,,	10. 22. ±	J.	1	Red	0·8	None	18	38
November	20	8. 19. 30	P.	2	Bluish-white	1·5	None	10	39
December	6	8. 20. 0	P.	1	Orange	1	None	12	40
	,,	9. 17. 33	P.	2	Bluish-white	0·8	None	7	41
	,,	9. 36. 41	P.	> 1	Bluish-white	0·6	Train	5	42
	,,	10. 2. 16	P.	3	Bluish-white	0·5	None	..	43
December	8	10. 23. 14	G.	2	Bluish-white	0·6	None	..	44

November 12 and 13. The weather was unfavourable for the observation of meteors on these nights.

No. for Reference.	Path of Meteor through the Stars.
1	Appeared near α Canum Venaticorum moving from direction of a point midway between λ Boötis and η Ursæ Majoris.
2	Appeared a few degrees below ψ Ursæ Majoris and moved towards horizon on a path in prolongation of line joining γ and ψ [Ursæ Majoris.
3	Passed across θ Lyræ and between γ Lyræ and β Cygni.
4	From near ϵ Persei to a point a little below ζ Aurigæ.
5	Appeared near β Aquilæ moving towards 67 Ophiuchi.
6	Passed a little above β Ursæ Majoris from direction of a point about 5° above δ Ursæ Majoris.
7	Passed midway between α and γ Ursæ Majoris to a point nearly midway between γ and β Ursæ Majoris, moving from [direction of α Draconis.
8	Passed between ϵ Cephei and β Cassiopeiæ and across Polaris.
9	From a point midway between α and ι Draconis, disappeared about 5° above α Canum Venaticorum.
10	From near η Aquarii, disappeared at β Capricorni.
11	Passed near δ Camelopardali and disappeared a little to left of Capella.
12	Passed between ι and θ Draconis in direction of β Boötis.
13	Passed midway between 1 Draconis and α Ursæ Majoris and disappeared about 2° to left of and 2° below γ Ursæ Majoris.
14	From direction of ξ Persei passed nearly across ι Aurigæ and 3° to left of β Tauri.
15	From direction of α Lyræ towards η Herculis.
16	Passed midway between β and θ Aquilæ towards δ Aquilæ.
17	From near ϵ Geminorum to a point about midway between α and γ Orionis.
18	From near β Ursæ Minoris towards λ Draconis.
19	From direction of γ Draconis to α Lyræ.
20	From λ Draconis towards 23 Ursæ Majoris.
21	From direction of γ Orionis to γ Eridani.
22	From direction of β Pegasi, disappeared near ι Pegasi.
23	From direction of ι Cassiopeiæ towards 2 Camelopardali.
24	From κ Ursæ Majoris towards ψ Ursæ Majoris.
25	Passed with a path curved towards the left from about 5° below Aldebaran to near η Orionis.
26	Moved from direction of γ Ursæ Minoris and passed midway between ι and θ Draconis.
27	Fell downwards parallel to Castor and Pollux from a point about 2° to right of the center of a line joining those stars.
28	Passed about 4° above and to the left of α Cygni and disappeared near ϵ Cygni.
29	Moved across δ Ursæ Majoris from direction of δ Ursæ Majoris.
30	Appeared near δ Ursæ Majoris travelling direct to η Ursæ Majoris.
31	Moved from a point about 5° to right of β Ursæ Majoris, passed across γ Ursæ Majoris.
32	Shot from ζ to η Ursæ Majoris.
33	Shot from μ Pegasi towards a point about 4° above and to left of α Pegasi.
34	Appeared near β Pegasi and disappeared at γ Pegasi.
35	Passed a little below and to left of β Orionis and disappeared at γ Orionis.
36	Appeared near α Orionis, passed between δ and ϵ and disappeared a little below β Orionis.
37	Appeared near β Ursæ Majoris, passed about midway between γ and δ and disappeared near η Ursæ Majoris.
38	Shot from β to γ Eridani.
39	Appeared a little above ζ Tauri and disappeared a little below μ Geminorum (slow motion).
40	Passed midway between α and ι Draconis from direction of β Ursæ Minoris.
41	From direction of 38 Leonis Minoris to λ Ursæ Majoris.
42	Moved from a point about 7° to left of δ Orionis towards γ Orionis.
43	Passed about 1° to right of α Lyræ perpendicularly towards horizon.
44	Appeared near α Orionis and disappeared a little below η Orionis.

Month and Day. 1876		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s							
December	13	7. 38. 10	G.	1	Bluish-white	0·4	Slight	4	1
	..	8. 43. 30	G.	2	Blue	1	Fine	12	2
	..	9. 13. 40	G.	1	Bluish-white	0·7	None	10	3
	..	10. 24. 10	G.	1	Bluish-white	0·6	Slight	9	4

No. for Reference.	Path of Meteor through the Stars.
1	Appeared near ζ Pegasi and disappeared a little below η Pegasi.
2	Passed from below β Pegasi and disappeared near ϵ Pegasi.
3	Passed midway between α and β Ursæ Majoris disappearing a little above γ and δ Ursæ Majoris.
4	Appeared near δ Orionis and disappeared near β Orionis.